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Abdominal wound dehiscence: a review of 60 cases at the University College Hospital, Ibadan

R. O. SENBANJO* AND O. O. AJAYI
Department of Surgery, University College Hospital, Ibadan, Nigeria

Summary

A total of 212 cases of abdominal wound dehiscence requiring secondary closure occurred in 8632 surgical obstetric and gynaecological laparotomies over a 7-year period ending in December 1981. The incidence of abdominal wound dehiscence at Ibadan was 2.5%. Contaminated wounds were the most susceptible with an incidence of 19%. A detailed review of 60 cases revealed a mean age of 29 years. Wound infection was the most prominent contributory factor. Tension sutures appeared to be ineffective in preventing wound dehiscence. Following secondary closure, 53% of the patients developed further wound complications, mainly wound infection, incisional hernia and repeat dehiscence. The average duration of hospitalization was 35 days and 7% of the patients died post-operatively.

Résumé

212 cas de plaie de dehiscence abdominale au total, exigeant clôture secondaire ont eu lieu en 8632 laparotomies gynécologiques obstetriques et chirgicales au cours de la durée terminee de 7 ans on December 1981. L'incidence de dehiscence de plaie abdominale à Ibadan était de 2.5%. Des plaies contamineés étaient franchement les plus susceptibles avec une incidence de 19%. La revue detaillée de 60 cas a dévoilé un age moyen de 29 ans. L'infection de plaie était le facteur de contribution le plus saillant. La suture de tension parait être inefficace d'empêcher la dehiscence de plaie. Suivant la clôture secondaire, 53% des malades ont eu de complications de plaie de plus, principalement l'infection de plaie, hernie incisionuelle et de dehiscence repetée. La durée moyenne d'hospitalisation était 35 jours et 7% des malades sont morts apres opèration.

*To whom correspondence should be addressed.

Introduction

Dehiscence is used to describe the separation of any of the sutured layers of a wound in the healing period [1]. Abdominal wound dehiscence is one of the most serious post-operative complications associated with surgical, obstetric and gynaecological laparotomies [2]. In spite of the many advances in surgery and the growth of knowledge concerning wound healing, dehiscence of abdominal wounds remains a significant problem [3,4].

Abdominal wound dehiscence is a major clinical problem in terms of the attendant morbidity, prolongation of hospital stay, cost of hospitalization and loss of work time [5]. This is particularly so in our environment where bed space and operating time are scarce and hospital funding inadequate. The condition has been poorly studied in this environment even though it occurs frequently enough to be of concern to surgeons [5]. This study was, therefore, undertaken to define the extent and pattern of the problem at the University College Hospital, Ibadan, Nigeria, in order to identify the group at risk.

Patients and methods

Only those patients in whom the extent of the dehiscence necessitated a return to theatre for resuture were included. Those with minor degrees of wound separation were not included.

From the theatre records all cases of abdominal wound dehiscence requiring surgical closure were obtained between January 1975

and December 1981. Over the same period, the total number of formal laparotomies was collected. Cases of appendicectomy through grid-iron incision, blind colostomies, mini-laparotomies and herniorrhaphies were excluded.

For the first 3 years of the study, all the laparotomy wounds were classified according to the degree of contamination at surgery [6].

Clean wounds

Wounds in which neither the alimentary tract nor the genito-urinary tract was entered and no pus or inflammation encountered (group I).

Potentially contaminated wounds

Wounds in which the alimentary tract or the genito-urinary tract was entered without unusual contamination during surgery (group II).

Frankly contaminated wounds

Wounds obviously contaminated with pus or faeces including clinical infections like peritonitis (group III).

The hospital records of 60 cases of wound dehiscence were reviewed. The following pre-operative and post-operative data were obtained — age, sex, primary disease, type of incision, degree of wound contamination at surgery, wound closure technique, grade of surgeon, degree of dehiscence, time of dehiscence, predisposing factors, wound complications and duration of hospitalization.

Results

Incidence

Over a 7-year period until the end of December 1981, there were 8632 laparotomies and 212 cases of wound dehiscence requiring secondary closure. The overall incidence of wound dehiscence was 2.5%. Table 1 shows the incidence of wound dehiscence in relation to the degree of wound contamination at primary surgery. The frankly contaminated wounds showed the highest incidence at 19.0%. The clean wounds and the potentially contaminated wounds had low incidence of wound dehiscence of 2.1% and 2.0%, respectively.

Age

The age distribution of the patients (Fig. 1) showed a peak incidence of 20–30 years with a mean age of 29 years. The youngest patient aged 3 weeks had a laparotomy for congenital pyloric stenosis, while the oldest patient, aged 75 years had laparotomy for peritonitis.

Sex

There were 15 males and 45 females in the series giving a M:F ratio of 1:3. However, 32 of the 45 females had laparotomy for obstetric and gynaecological conditions.

Primary disease

The diseases for which laparotomy was under-

Table 1. Incidence of wound dehiscence in relation to the degree of wound contamination at primary surgery

Degree of wound contamination	Total. no. cases	Total no. dehisced wounds	Incidence (%)
Group I	467	10	2.1
Group II	3010	59	2.0
Group III	116	22	19
Total	3593	91	2.5

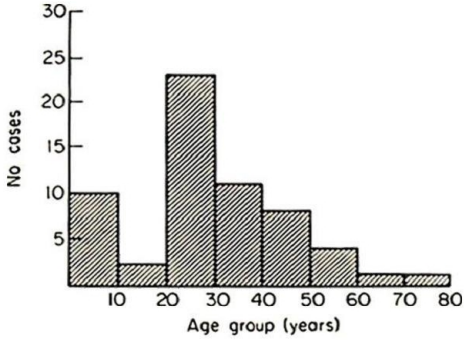

Fig. 1. Distribution of patients by age groups.

taken are as listed in Table 2. There were 28 general surgical, 24 obstetric and eight gynaecological cases.

Incision

Table 3 shows the incisions used in the reviewed cases. Lower midline incisions were commonly employed in obstetric and gynaecological surgery while the general surgeons commonly employed paramedian incisions.

Wound closure at primary surgery

Fifty wounds were closed in layers using interrupted or continuous chromic catgut sutures to the fascia layer, while 10 wounds, all frankly contaminated, had reinforcement of the layered closure with nylon tension sutures (Table 4).

The 19 frankly contaminated wounds with dehiscence were compared with 46 similar wounds which healed without dehiscence in relation to the wound closure at primary surgery. These 46 cases were randomly selected and were treated within the same period. There was no significant difference between the two groups (Table 5).

Grade of surgeon

Consultants were responsible for 14 (23%) of the cases of abdominal dehiscence, while senior registrars and registrars were responsible for 33 cases (55%) and 13 cases (22%), respectively.

Time of dehiscence

Figure 2 shows the time of dehiscence. The majority occurred between the sixth and twelfth post-operative day.

Degree of dehiscence

There were 19 cases of complete wound dehiscence (burst abdomen), seven cases of deep partial dehiscence and 34 cases of superficial dehiscence (Table 6). None of the dehiscence in clean wounds was superficial. However, the majority of wound dehiscence in potentially contaminated and frankly contaminated wounds were superficial — 57% and 68%, respectively.

Table 7 shows the degree of dehiscence in relation to the type of closure at primary surgery. Four of 10 wounds reinforced with tension sutures subsequently dehisced completely with bowel showing in the wound. Tension sutures did not prevent complete wound dehiscence in these cases.

Predisposing factors

The pre-operative and post-operative factors predisposing to wound dehiscence were as shown in Table 8. Wound infection was the leading predisposing factor, being present in 77% of all cases. Infection was present in 88% of wound with superficial dehiscence while 57% of complete wound dehiscence and 60% of deep incomplete dehiscence were infected.

Mechanical factors leading to raised intra-abdominal pressure and anaemia and malignancy were identified as the predisposing factors in seven, four and three patients, respectively. The result of haemoglobin genotype was available in only 14 of the 60 patients studied. Haemoglobin genotype A was present in eight patients (57%), AS in four patients (29%), AC and SC in one patient (7%) each. There was no patient with the SS genotype.

Morbidity

Table 9 shows the wound complications follow-

Table 2. Primary disease

	Disease	No. patients
Surgical (28)		
Peritonitis:	Perforated appendix	6
	Typhoid perforation	4
	Perforated duodenal ulcer	3
	Unspecified	5
Intestinal obstruction:	Intussusception	2
	Volvulus	1
Malignancy:	Gastric carcinoma	1
	Pancreatic carcinoma	1
	Ovarian carcinoma	1
Others:	Bleeding duodenal ulcer	2
	Congenital pyloric stenosis	1
	Biliary atresia	1
Obstetrical (24)		
	Obstructed labour	6
	Foetal distress	4
	Pre-eclampsia/eclampsia	4
	Ruptured uterus	3
	Previous Caesarian section	3
	Ante partum haemorrhage	2
	Delayed second stage	1
	Transverse lie	1
Gynaecological (8)		
	Fibroids	6
	Tubo-ovarian mass	1
	Ovarian cyst	1

Table 3. Types of incision

Type of incision	No. cases
Midline	
Upper	5
Lower	30
Paramedian	22
Transverse	3
Total	60

ing secondary suturing of the dehisced wounds. Only 47% of the wounds healed without further complications. The duration of hospitalization varied from 3 to 15 weeks with a median of 5 weeks (Fig. 3).

Mortality

Four of the 60 patients (7%) died after closure of the dehisced wounds. The operative diagnoses in these patients were carcinoma of the head of pancreas, ovarian carcinoma, typhoid perforation and uterine fibroid. The first three patients had complete dehiscence while the fourth patient had superficial dehiscence. The mortality was 16% in patients with complete dehiscence and 2.4% in those with incomplete dehiscence.

Table 4. Wound closure at primary surgery in relation to degree of wound contamination

Degree of wound contamination	No. wounds closed in layers	No. wounds closed in layers + tension sutures	Total
Group I	4	—	4
Group II	37	—	37
Group III	9	10	19
Total	50	10	60

Table 5. Wound closure in frankly contaminated wounds

	No. wounds closed in layers	No. wounds closed in layers + tension sutures
Control (normal healing)	22	24
Wounds with dehiscence	9	10

$\chi^2 = 0.001$.
P = Not significant.

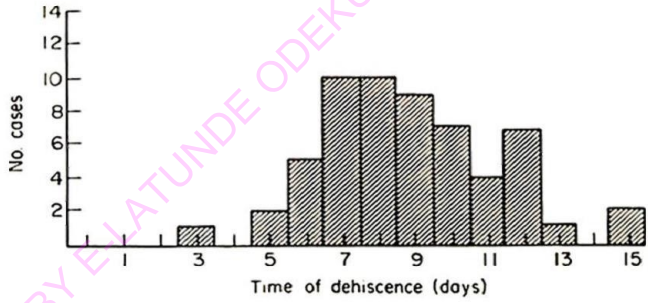

Fig. 2. Time of occurrence of dehiscence.

Table 6. Degree of dehiscence in relation to the degree of wound contamination

Type of dehiscence	Degree of contamination			Total
	Group I	Group II	Group III	
Complete (burst abdomen)	3	11	5	19
Partial: Deep	1	5	1	7
Superficial	—	21	13	34
Total	4	37	19	60

Table 7. Degree of dehiscence in relation to wound closure technique in frankly contaminated wounds

Type of dehiscence	Closure technique	
	Layered closure	Layered closure + tension suture
Complete (burst abdomen)	1	4
Partial: Deep	1	—
Superficial	7	6
Total	9	10

Table 8. Predisposing factors (pre- and post-operative)

	Complete dehiscence	Deep dehiscence	Superficial dehiscence	Total*
Wound infection	12 (57%)	6 (60%)	28 (88%)	46 (77%)
Mechanical factors	5	1	17	
Anaemia	—	3	1	4
Malignancy	3	—	—	3
Wound haematoma	—	—	2	2
Obesity	1	—	—	1

*More than one factor present in some patients.

Table 9. Wound complications following secondary suturing of dehisced wounds

Wound complications	No. patients	Percentage
No further complication	28	47
Further complications present	32	53
Wound infection	16	27
Incisional hernia	9	15
Repeat dehiscence	3	5
Faecal fistula	2	3
Discharging sinus	2	3
Ugly scar	1	2
Painful scar	1	2

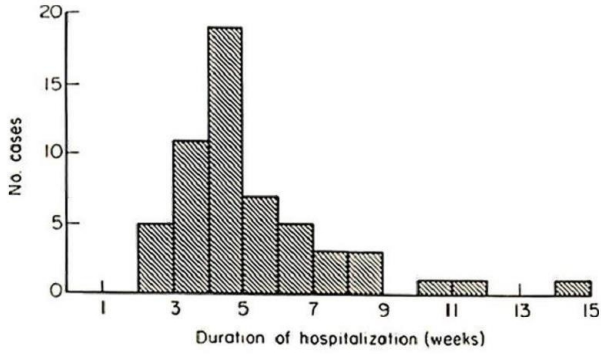

Fig. 3. Duration of hospitalization.

Discussion

The incisional wound is the product and responsibility of the surgeon. In spite of the many advances in surgery and the growth of knowledge of wound healing, dehiscence of the abdominal wound continues to haunt the general surgeon [4]. This serious and at times disastrous surgical problem mars what might otherwise have been successful surgery.

Abdominal wound dehiscence may be complete or partial [7–9]. In complete abdominal wound dehiscence (burst abdomen, evisceration), all the layers of the abdominal incision have separated and viscera protrude into the wound [10]; partial dehiscence may be revealed or concealed [11]. The revealed variety is superficial when the anterior rectus downwards remain intact, while it is deep when only the posterior rectus and peritoneum remain intact. The peritoneum and fascia alone may give way leaving the skin intact [8]. These cases of concealed partial dehiscence result in incisional hernia, detected at follow-up, which should last at least 1 year [10,12]. When the cases of subsequent herniation without any overt dehiscence are added to the cases that are known to have dehisced in hospital, a measure of the 'total failure of wound healing' can be obtained [13]. The cases with subsequent incisional hernia were not included because the patients did not attend follow-up clinics for sufficiently long periods of time.

Many clinical studies have attested to a continuing steady incidence of abdominal dehiscence of 0.5 to 5% depending on the type of patient and the type of wound studied [14]. The incidence for surgical obstetric and gynaecological laparotomies at Ibadan was 2.5%. At the Lagos University Teaching Hospital, the incidence of complete abdominal dehiscence was 1.26% [5]; while at the University of Nigeria Teaching Hospital, Enugu, the incidence among women undergoing Caesarian section was 2.6% [9].

Wound infection remains the most significant factor affecting wound healing [10]. However, its role as a local weakening factor is thought to be less important by some workers [13]. The incidence of dehiscence of 19% in frankly contaminated wounds compared with 2% in clean wounds emphasizes the role of infection in wound dehiscence. In a study of typhoid perforation again at Ibadan, 15 of 58 frankly contaminated wounds (26%) required secondary closure [15]. Studies from other centres have confirmed this observation [4]. Wound infection was a contributory factor in 77% of the patients studied at Ibadan, and in 71% of the cases from Enugu [9]. Wound infection was associated with a higher proportion of wounds with superficial dehiscence. However, infection may supervene in a wound already disrupted by mechanical factor.

Mechanical factors play an important part in wound dehiscence [16]. An abdominal wound will dehisce if the intra-abdominal pressure is too great or the wound (sutures or the tissues) too weak or both [17]. Mechanical factors were clearly documented as present at the time of dehiscence in only seven patients (12%). However, mechanical factors as a cause of wound dehiscence are more difficult to diagnose accurately because they are not always immediately evident at the time of occurrence of wound dehiscence [9]. Abdominal disten-

sion, straining during extubation, vomiting and coughing are causes of raised intra-abdominal pressure. They result in abdominal wound dehiscence when the sutures break, knots slip, intact sutures cut through the tissues or gut protrudes between stitches [16]. The tissues may be weak as a result of anaemia, malignancy or malnutrition.

Layered closure is considered adequate for most surgical wounds except in patients with expected poor wound healing when the use of tension sutures become desirable [18]. The results of this study support the view that tension sutures applied at wide intervals have no advantage in preventing wound dehiscence [3,13] and they certainly do not prevent the appearance of incisional hernia [12,19]. A mass closure technique with large bites, sufficiently small stitch intervals and optimum tightness of the tie is more effective in preventing wound dehiscence than layered closure [13,18]. For a continuous stitch, the straight length of material should be at least four times that of the wound and the bites at least a centimetre deep and less than this apart [16].

The morbidity following secondary suturing was high as 53% of the patients developed further wound complications (Table 9). Incisional hernia was detected in 15% of the patients, but the true incidence may be higher as many patients were lost to follow-up. At the very least, just less than half of the patients whose abdominal wound burst develop an incisional hernia [12]. The overall mortality was 7%, but the mortality rate was higher in patients with complete dehiscence (16%) compared with those with incomplete dehiscence (2.4%). Although the mortality is high and dehiscence may be the final factor, mortality is often due to the underlying disease [8].

The consequences of abdominal wound dehiscence are prolonged hospitalization, increased morbidity and mortality, increased cost of medical care and loss of work time. Prevention depends on a meticulous surgical technique along with recognition of risk factors; the most important in this environment being wound infection and mechanical factors. Gross wound contamination must be recognized and appropriate intra-operative irrigations used. In this group of patients, one layer closure using a monofilament non-absorbable suture material should further reduce the frequency of this distressing complication [10,19].

References

1. Higgins GA, Antkowiak JG, Esterkyn SH. A clinical and laboratory study of abdominal wound closure and dehiscence. Arch Surg 1969;98:421–7.
2. Baggish MS, Lee WK. Abdominal wound disruption. Obstet Gynaecol 1975;46:530–4.
3. Keill RH, Keitzer WF, Nichols WK, Henzel J, Deweese MS. Abdominal wound dehiscence. Arch Surg 1973;106:573–7.
4. Greenburg AG, Saik RP, Peskin GW. Wound dehiscence: pathophysiology and prevention. Arch Surg 1979;114:143–6.
5. Owoseni AA, Sowemimo GVA. Burst abdomen (1968–1973). A six year review in Lagos University Teaching Hospital. Nig Med J 1977;7:442–6.
6. Higson RH, Kettlewell MGW. Parietal wound drainage in abdominal surgery. Br J Surg 1978; 65:326–9.
7. Mowat J, Bonnar J. Abdominal wound dehiscence after Caesarian Section. Br Med J 1971; 2:256–7.
8. Pratt JH. Wound healing — evisceration. Clin Obstet Gynaecol 1973;16:126–34.
9. Chukudebelu WO, Okafor EI. Burst abdomen following caesarean section. Int J Gynaecol Obstet 1978;15:532–4.
10. Bucknall TE. Factors influencing wound complications. A clinical and experimental study. Ann R Coll Surg 1983;65:71–7.
11. Shepherd JA. Abdominal wound disruption (letter). Lancet 1965;ii:82–3.
12. Grace RH, Cox S. Incidence of incisional hernia after dehiscence of abdominal wound. Am J Surg 1976;131:210–2.
13. Goligher JC, Irvin TT, Johnston D, de Dombal FT, Hill GL, Horrocks JC. A controlled clinical trial of three methods of closure of laparotomy wound. Br J Surg 1975;62:823–29.
14. Dudley HAF. Layered and mass closure of the abdominal wall: a theoretical and experimental analysis. Br J Surg 1970;57:664–7.
15. Olurin EO, Ajayi OO, Bohrer SP. Typhoid perforations. J R Coll Surg Edin 1972;17:353–62.
16. Jenkins TPN. The burst abdominal wound: a mechanical approach. Br J Surg 1976;63:873–6.
17. Reitamo J, Moller C. Abdominal wound dehiscence. Acta Chir Scand 1972;138:170–5.
18. Karakonsis CP. One layer closure of the abdominal wall. Surg Gynaecol Obstet 1980;150:243–4.
19. Sanders RJ, Diclementi D. Principles of abdominal wound closure: II prevention of wound dehiscence. Arch Surg 1977;112:1188–91.