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Original Research Article

Study on wound healing following major abdominal gynaecological surgeries in a tertiary care hospital

Sandhyasree Panda*, Madhavi Uppala

Department of Obstetrics and Gynaecology, Maharajah's Institute of Medical Sciences, Vizianagaram, Andhra Pradesh, India

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***Correspondence:**
Dr. Sandhyasree Panda,
E-mail: dr.sandhyasree@gmail.com

ABSTRACT

Background: In the fancy era of minimal invasive, day care and scarless surgery, abdominal operation through a laparotomy is but a last choice for the mediocre. Surgical site wound healing is a benchmark for patient as well as surgeon satisfaction following an abdominal operation. It is a determinant of preop preparation, intra and post op management by the healthcare system and the duration of hospital stay as well as burden of disease. Aim of the study was to study the spectrum wound healing, and post operative hospital stay in patients undergoing major gynaecological abdominal surgeries. To assess and correlate the underlying risk factors for wound healing.
Methods: This was a hospital based prospective study carried out in a tertiary care centre in north A.P. on patients who underwent major abdominal gynaecological surgeries during one year from January 2022 to December 2022. Determinants like patient age, BMI, anaemia, HTN, Diabetes mellitus, hypothyroidism were studied & made observations on wound healing, SSIs and post operative hospital stay in all the cases. Statistical analysis was done using SPSS version 22, P value <0.05 taken as significant.
Results: Among 100 major abdominal gynaecological surgeries studied, 20 cases developed delayed wound healing, one case developed complete dehiscence, thus, incidence of wound dehiscence was 1%, rate of SSI was 12%. Anaemia, DM, obesity and HTN were significantly associated with poor wound healing in that order.
Conclusions: Optimisation of the patient's health condition before taking up for elective surgeries is important for better recovery of the patients.

Keywords: Abdominal gynaecological surgeries, Postoperative hospital stay, Surgical site infection, Wound healing, Wound dehiscence

INTRODUCTION

Postoperative wound healing plays a significant role in facilitating patients' recovery and rehabilitation. The wound healing process (WHP) is a highly structured and well-organized biological process.[1] Wound healing can be divided into 4 phases; Haemostasis, Inflammation, Proliferation, and Tissue Remodelling.[2] Dehiscence is a partial or total separation of previously approximated wound edges, due to failure in proper wound healing. Partial dehiscence means that the edges of an incision have pulled apart in one or more small areas. Complete dehiscence is when the entire cut reopens through all layers of skin and muscle. This scenario typically occurs 5 to 8 days following surgery when healing is still in the early stages. The causes of dehiscence include ischemia, hematoma, infection, increased abdominal pressure, diabetes, malnutrition, and obesity.[3] Wound dehiscence is estimated to occur in 0.5–3.4% of abdominopelvic surgeries. Postoperative wound dehiscence has been adopted as a surrogate safety outcome measure since it impacts morbidity, length of stay, healthcare costs and

readmission rates.[4] Factors which influence wound healing are age, BMI, anaemia, comorbidities like HTN, DM, Hypothyroidism, and other chronic disorders; healing also depends on the type of surgery whether it is primary or secondary, duration of surgery, type of closure and use of abdominal or parietal drain. Proper identification of patients at risk, prevention of surgical site infections, and appropriate post-surgical wound assessment can help decrease the incidence of postoperative wound dehiscence. The mechanism with which risk factors affect the wound healing: Age- Wounds in older patients may heal more slowly than those in younger patients due to slowing of tissue regeneration, repair and remodelling due to inherent loss of muscle mass, capillary defects and associated comorbidities that might accompany as a person ages. Older patients may have inadequate nutritional intake, altered hormonal responses, poor hydration, and compromised immune, circulatory, and respiratory systems, any of which can increase the risk of skin breakdown and delay wound healing.[5] Malnutrition/Hypoalbuminemia- protein status is essential for fibroblast proliferation, collagen synthesis and angiogenesis.[6] Diabetes is a microvascular disease can impair blood flow.[7] Hypertension causes tissue oedema and decrease in oxygen supply to wound.[8] Obesity causes vascular insufficiency, altered immune mediators, deficiencies of macro and micro nutrients.[9] The repetition of laparotomy interferes with the wound healing and contributes to the development of systemic impact of immune compartments.[10] Surgical site infection (SSI) is a wound infection that occurs within 30 days of an operative procedure and the infection is thought to be secondary to surgery. The rate of SSI is 1 to 3 % of all surgical procedures and is much higher i.e.,15 -25 % in abdominal surgeries.[11] The risk factors associated with SSI are age, BMI, DM, urgency of the surgery, length of operation. Aim of the study was to study the wound healing following major abdominal gynaecological surgeries in a tertiary care hospital and the objectives were to estimate the incidence of wound dehiscence and SSI in patients undergoing major abdominal gynaecological surgeries. To correlate between wound dehiscence and underlying risk factors including other comorbid conditions. To count the duration of stay in hospital among postoperative patients there by measuring the morbidity and burden of the disease.

METHODS

This study was a hospital based prospective observational study carried out at Maharajah's institute of medical sciences, Vizianagaram, Andhra Pradesh, on patients who underwent major abdominal gynaecological surgeries during one year between January 2022 and December 2022. A total of 100 patients who underwent various abdominal surgeries like total abdominal hysterectomy, ovarian cystectomy, myomectomy, trans abdominal Sacro colpopexy, exploratory laparotomy for ruptured ectopic were studied. Determinants like patient's age, BMI, risk factors like anaemia, HTN, DM, hypothyroidism and other chronic disorders, history of prior abdominal surgeries were taken into consideration. For all the cases we followed the same antibiotic prophylaxis according to the standard hospital protocol, and surgical aseptic precautions. Precautions taken to avoid undue handling and prolongation of surgery. Observations were made on spectrum of wound healing like SSI, wound dehiscence, secondary suturing, and post operative hospital stay in all the cases and correlation was done with underlying risk factors. Statistical analysis was done using SPSS version 22, P value <0.05 is taken as significant.

RESULTS

Table 1 shows delayed healing in 20 % of the cases, partial dehiscence in 7% of the cases and complete dehiscence in one case, thus incidence of wound dehiscence is 1%. 12 cases healed by secondary intension and secondary suturing needed in 8 cases.

Table 1: Spectrum of wound healing and secondary suturing.

Healing	No. of cases	Percentage	Secondary suturing.
Normal	80	80%	Nil
Delayed healing	20	20%	Nil
Partial dehiscence	7	7%	7
Dehiscence	1	1%	1

Table 2: Delayed healing in different age groups.

Age	No. of cases	Delayed wound healing	Percentage
20-30	13	NIL	0%
31-40	40	7	17.50%
41-50	34	9	26.40%
51-60	8	3	37.50%
61-70	3	NIL	0%
>70	2	NIL	0%

Table 2 shows incidence of delayed wound healing is more in the age group 51-60 years with 37.5%, followed by 41 to 50 years with 26.4% of cases.

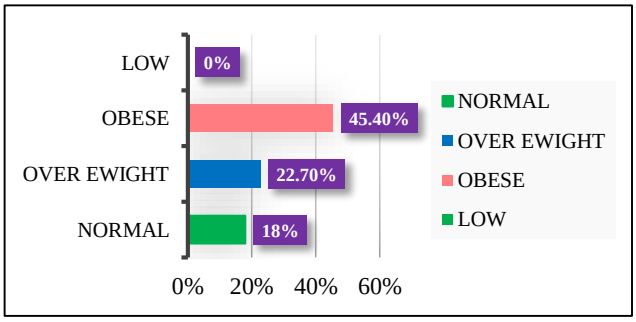

Figure 1: Delayed wound healing and BMI.

Figure 1 shows delayed wound healing among18% of patients with Normal BMI, 22.7 % and 45.5% of the patients in over weight and obese categories respectively.

Table 3: Delayed healing and anaemia.

Anaemia	No. of cases	Delayed healing	Percentage
Absent	46	6	13.04%
Mild	12	2	16.60%
Moderate	37	9	24.32%
Severe	4	2	50%
Very severe	1	1	100%

Table 3 shows wound healing was proportionately impaired with the severity of anaemia. It was 13.04% in normal cases where as 100 % in very severe anaemia.

Table 4: Incidence and correlation of delayed healing with respect to the risk factors.

Risk factors	Present /Absent	No. of cases	Delaye healing	%	P-value
Anaemia	Present	42	12	28.50	0.03
	Absent	58	8	13.70	
HTN	Present	22	10	45.40	0.001
	Absent	78	10	12.80	
DM	Present	9	5	55.50	0.01
	Absent	91	15	16.40	
Hypothy -roidism	Present	11	3	27.20	0.38
	Absent	89	17	19.10	

Table 4 shows presence of anaemia was significantly associated with delayed wound healing, like Hypertension and diabetes mellitus. In patients with hypothyroidism non-significant association was observed.

Table 5: Correlation between type of surgery and delayed wound healing.

Type of surgery	No. of patients	Delayed healing observed	Percentage	P valu
Primary	72	14	19.40%	
Secondary	28	6	21.40%	0.82

Table 6: Average post operative hospital stay in days.

Wound healing	Average days of hospital stay
Normal	8
Delayed	12
Partial dehiscence	18.5
Complete dehiscence	29

Table 6 shows average post operative hospital stay in normal healing cases was 8 days, where as in delayed healing cases it was 12 days and in partial dehiscence cases it was 18.5 days. In complete dehiscence case the postoperative hospital stay was 29 days.

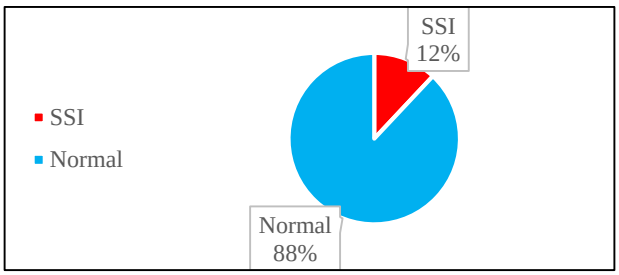

Figure 2: Rate of SSI.

Figure 2 shows among 20 cases of delayed wound healing surgical site infection was observed in 12 cases with overall SSI rate was 12%.

DISCUSSION

Spectrum of wound healing and incidence of wound dehiscence

From Table1, we observe that out of 100 major abdominal gynaecological surgeries, 80% of the patients had normal wound healing. A few altered scenarios were: minimal raw area and minimal serosanguinous discharge from wound, partial gaping of the wound and complete dehiscence of the wound. Twenty subjects developed delayed wound healing, out of which 12 cases were healed by secondary intension and 8 cases required secondary suturing. Among those eight, 7 cases had partial dehiscence and 1 case had complete disruption including rectus sheath. Thus, the incidence of wound dehiscence in the present study is 1%, comparable to study done by Narang et al who reported postoperative wound gaping being 2.2%.[12] In another study done by Metgud MC, Kataria A etalthe incidence is 3.05%.[13]

Incidence of delayed wound healing according to age group

As depicted in Table 2, all cases have normal wound healing in 20-30 years of age. As the age progresses there is increase in the incidence of delayed healing. In the present study incidence of delayed wound healing is more in the age group 51-60 years, followed by 41 to 50 years. Though we have few cases above 60 years, who did not have any delayed healing were because of normal BMI and absence of risk factors. In a study done by Metgud MC, et al the incidence of wound dehiscence is more in 40-49 years when compared to other age groups.[14]

BMI association

It is showed in Figure 1, patients were grouped into 4 categories based on body mass index (BMI in kg/m^2) into normal (18-24.9), over weight (25-29.9), obese (>30) and

low BMI (<18). In our study, patients with normal BMI were 61 %, 26% were overweight, 13% had obesity and 1 % was low BMI. Delayed healing in normal cases was 18.03% where as in obese cases it was 45.4%. Lower the patients' BMI, higher is the recovery rate. Yvonne N. et al showed that higher BMI is associated with increased incidence of surgical complications, including atelectasis, thrombophlebitis, wound infection, wound separation, and mortality.[1,2,15]

Prevalence of anaemia

In our study patients were divided into normal (Hb:>11g/dl), mild (10-10.9g/dl), moderate (7-9.9 g/dl), severe (4-6.9 g/dl), and very severe (<4 g/dl). As shown in the table 3, the prevalence of anaemia was 54%. The incidence of delayed wound healing was 13.04%, 16.6%, 24.3%, 50%, 100%, in normal Hb, mild, moderate, severe, very severe anaemia respectively. There was a significant association between anaemia and impaired wound healing with a P-value of 0.03. Similar results were observed in a study done by Sonwani B, et al, 60-70% of impaired wound healing was observed in moderate to severe anaemia cases.[16]

HTN and wound dehiscence

HTN is one of the common comorbid conditions observed in preoperative cases. As shown in the Table 4, HTN is prevalent in 22 % of cases, out of them 45.4% developed delayed wound healing in comparison to normotensive patients with a P-value of 0.001 which is highly significant. The study done by Metgud MC et al showed similar results that HTN is the leading cause of wound dehiscence followed by DM.[17]

Diabetes and wound healing

Table 4 showed prevalence of diabetes was 9% in the study group; when compared to non-diabetes cases diabetes patients have more incidence of wound related complications. Delayed wound healing was seen in 55.5% of diabetes group and 16.4% in non-diabetes group, with a P-value of 0.03, the association is statistically significant.

The study done by Maqsood R et al showed there is 42.6% cases have wound related complications and there is 13.1% wound infection rate and 5.4 % wound dehiscence in diabetes population.[18]

Hypothyroidism and wound healing

The prevalence of hypothyroidism was 11% as shown in the Table 4. Incidence of delayed wound healing in hypothyroid cases is 27.2% and in non-hypothyroid cases is 19.1%. P value is 0.38. According to present study there is a positive correlation between hypothyroidism and wound healing which is non-significant. Rosko AJ, et al studied that there are hypothyroidism patients have 11.4 times risk of develop impaired wound healing.[19]

Correlation with previous surgeries

As shown in the Table 5, patients who underwent primary surgery was 72%; history of previous abdominal surgeries was present in 28 % of the patients. 19.4% cases of primary surgeries and 21.4% of secondary surgeries had delayed wound healing. P value is 0.82: there is no significant association between repeat abdominal surgeries and delayed wound healing. According to the study done by Esendagli G, et al repetition of abdominal surgeries not only interferes with the wound healing but also contributes to the development of imperfectly healing wounds which have systemic impact on immune compartments.[20]

Surgical site infections (SSI)

It is shown in the Figure 2. Wound discharge sent for culture and sensitivity. Surgical site infection was observed in 12 cases, the various organisms responsible for SSI were coagulase positive staphylococcus (5), E. coli (4), enterococcus (2), pseudomonas (1) and 8 cases got sterile cultures. The overall incidence of SSI in our study is 12%. Study done by Aga et al showed that SSI rate of 22%.[21] Another study done by Borle FR.et al showed the SSI rate of 39%.[22]

Average hospital stay: As shown in the table 6, average post operative hospital stay in normal healing cases was 8 days, where as in delayed healing cases it was 12 days and in partial dehiscence cases it was 18.5 days. In complete dehiscence case the postoperative hospital stay was 29 days. According to the study done by Taylor GD, Kirkland TA et al average hospital stays in patients having superficial wound infections is 13.2 days and those having deep seated infections are 24.3 days.[23]

In our observation one case who developed complete wound dehiscence had multiple risk factors like elderly age, obesity, HTN, DM with uncontrolled sugar levels and COPD posted for abdominal Sacro colpopexy. She developed induration, wound discharge, and complete dehiscence. Daily dressings were done followed by debridement and secondary suturing were done on day 18, subsequently she developed cellulitis leg and got discharged on day 29.

Limitations

Less sample size and type of abdominal incision for each individual risk factor to compare, duration of the surgery was not taken into consideration which could be a confounding factor.

CONCLUSION

This is a study regarding spectrum of wound healing, various risk factors associated with delayed wound healing, rate of SSI and post-operative hospital stay in 100 patients who underwent major abdominal gynaecological surgeries. Among all the cases, 20 cases developed

delayed wound healing, out of those, 12 cases healed by secondary intention and 8 cases developed wound dehiscence and required secondary suturing. Complete wound dehiscence was observed in one case, with an overall incidence of wound dehiscence as 1%. Incidence of surgical site infection was 12%. Incidence of delayed wound healing was more in age groups 51 to 60 years followed by 41to 50 years.

Among 100 patients, 67 patients had one or more risk factors and other comorbid conditions. Regarding the association with delayed wound healing, Obesity had 45.4%, anaemia had 58%, HTN had 45%. DM had 55.5%. Hypothyroidism had 27.2 %, recurrent surgeries had 21.4% According our study anaemia is the most significant risk factor for delayed wound healing followed by DM, obesity, and HTN in that order. Hypothyroidism and recurrent surgeries were non-significant although had increased incidence of delayed wound healing. All the risk factors have a negative impact on wound healing, thus prolonging the hospital stay. Hence optimisation of the patient's health condition before taking up for elective surgeries is important for better recovery of the patients.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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