Original Article

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Risk Factors for Peripartum Wound Dehiscence

Obstetrics and Gynaecology Section

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ABSTRACT

Introduction: Wound Dehiscence (WD) following Vaginal Delivery (VD) or Cesarean Delivery (CD) causes considerable discomfort to the woman, leading to significant physical, emotional and financial burden. The rate of Perineal Wound Dehiscence (PWD) is relatively low and more common with instrumental delivery. However, there is minimal information on the incidence and risk factors causing WD, especially for PWD.

Aim: To assess the incidence and risk factors of peripartum wound dehiscence.

Materials and Methods: This retrospective study was conducted in a large tertiary care centre where there were 14759 deliveries. 4671 women had caesarean deliveries and 10,088 women had the vaginal delivery. There were 86 cases (0.8%) of WD in the VD group and 95 (2%) in the CD group. These cases were compared with twice as many controls.

Results: Induction of Labour (IOL) and BMI >30 kg/m^2 were more common in cases compared to controls in the CD group. However, on multivariate analysis, this association was not seen. IOL, meconium stained liquor (MSAF), instrumental delivery and use of episiotomy was more common among cases than controls in the VD group. IOL did not show up as an independent risk factor on multivariate analysis.

Conclusion: An association between IOL, primigravidae, instrumental delivery and MSAF was seen with peripartum WD.

Keywords: Episiotomy, Induction of labour, Instrumental delivery, Obesity, Surgical site infection

INTRODUCTION

Wound dehiscence following VD or CD cause considerable discomfort to the woman, leading to significant physical, emotional and financial burden [1,2]. The rate of PWD is relatively low and more common with instrumental delivery [3]. However, there is minimal information on the incidence and risk factors causing PWD [3,4]. Unlike PWD, there are several studies that looked at the risk factors for Surgical Site Infection (SSI) following cesarean sections [5-7]. The rate of SSI following cesarean section is about 1 to 5% [7-9]. Rates up to 16% have been described in high-risk cases [10]. WD is caused either due to infection or due to other factors such as obesity, diabetes, anaemia, surgical technique resulting in poor perfusion etc.

Routine episiotomy is not recommended for the normal delivery [11] and sometimes in instrumental delivery [3,12,13] in many developed countries. However, this is not implemented in some developing countries. Use of prophylactic antibiotics for skin incision, clipping of pubic hair and the use of chlorhexidine for skin preparation has been shown to reduce wound infection following CD [14]. The potential risk factors for WD are anaemia, gestational diabetes, hypertensive diseases, induction of labour, premature rupture of membranes, number of vaginal examinations following rupture of membranes, duration of rupture of membranes, use of amnioinfusion, chorioamnionitis, meconium staining, episiotomy, sphincter injury and instrumental delivery [3,5,14].

The potential risk factors for cesarean sections would also include emergency LSCS, previous cesarean sections, use of evidence-based practices, presence of adhesions, the experience of operator, use of suture material, LSCS following Trial of Labour After Cesarean (TOLAC) etc., [5-7].

There is no information on peripartum WD from tertiary centres in developing countries where the facilities have to accommodate a large number of women in labour. Thus, the present study aimed to look at potential risk factors and incidence of peripartum wound dehiscence.

MATERIALS AND METHODS

This retrospective cohort study was conducted in a large tertiary centre in South India with 14,759 deliveries between January and December 2016. The study was approved by the Institutional Review Board (IRB No.10601 {Retro} dated 29-03-2017). This facility from where records were obtained followed by evidence-based practices to the extent possible.

All women with WD that needed primary repair or managed conservatively with dressings resulting in secondary healing were included as cases. Controls were selected in a 1:2 fashion from the electronic register matched for delivery by the same route, same day and with the same team of doctors and midwives that did not have WD at discharge or at the six week postnatal visit. Women with intact perineum were excluded.

The use of prophylactic antibiotics just before the incision was followed for all cesarean deliveries [15], but authors did not use antibiotics for normal or instrumental delivery [16], unless there was a complication such as a sphincter injury or vaginal haematoma. Episiotomies were performed in almost 70-80% of cases, unlike most developed countries. Perineal hair was not shaved but clipped. Chlorhexidine skin preparation was used for cesarean sections [14] and benzalkonium chloride solution was used for skin preparations in vaginal deliveries. Episiotomy of vaginal tears was sutured using continuous sutures for vaginal mucosa and interrupted sutures for muscle. Skin was sutured with mattress sutures. Suture material used for episiotomies or vaginal tears was the absorbable 2-0 rapid vicryl, All cesareans were done by a Pfannenstiel incision [8]. Subcutaneous tissue, rectus sheath and uterus were opened by the blunt technique. Uterus was closed in two layers if it was the first cesarean section and in one layer when the woman wanted sterilisation with a previous cesarean section. Interrupted subcutaneous sutures were inserted if the subcutaneous tissue was more than two centimetres. Skin was sutured by mattress sutures or subcuticular sutures. Normal vaginal deliveries were conducted by

midwives or house surgeons with one or more years of experience. Most operative vaginal deliveries were performed by registrars with three or more years of experience. Induction of labour was done using 25 µg of vaginal misoprostol or 50 µg of oral misoprostol at four hourly intervals.

This facility has a meticulous record keeping along with a register for all WD. This register was maintained by research assistants who visited both, the postnatal wards and the outpatient treatment room daily to find cases of WD that was managed either with primary suturing or with dressings. During the year 2016 there were 4,671 women who underwent cesarean section and 10,088 women who had vaginal deliveries. Among vaginal deliveries, 2,526 women had instrumental delivery. Authors have a high instrumental delivery rate of 26% unlike other countries [3]. Out of the instrumental deliveries, 36% were delivered by outlet forceps and the rest were delivered by low forceps or suction cups. All women delivered by an instrumental delivery had an episiotomy. Women were generally discharged on the second or third postnatal day after VD and third or fourth postnatal day after CD, in the absence of any maternal or neonatal complication. Most women had a six week postnatal checkup, the details of which were entered into the patient notes. Women with complications generally returned to the facility [8]. Antenatal and inpatient records were retrieved and all details were collated by the first author. Parameters assessed were, gestational age, parity, IOL, mode of delivery, indication for operative delivery, date of diagnosis of WD, potential risk factors etc.

STATISTICAL ANALYSIS

Categorical variables were summarised using counts and percentages. Quantitative variables were summarised using median and IQR. Mann-Whitney U-test was used to compare the medians between two groups. Chi-square test was used to compare the proportions between the groups. The predictors were determined using adjusted and unadjusted logistic regression. For all the analysis, 5% level of significance was considered to be significant.

RESULTS

The number of WD following 10,088 vaginal deliveries was 86 (0.8%). The baseline characteristics have been presented in [Table/Fig-1]. Age of the woman, gestational age at delivery and BMI >30 kg/m^2 were similar in both cases and controls. There were significantly more primigravidae among the cases when compared to controls. Among the potential antepartum and intrapartum risk factors in women with perineal wound dehiscence, anaemia in the antenatal period was more common among controls and this was statistically significant [Table/Fig-2a]. More number of women had IOL in cases compared to controls. Meconium stained amniotic fluid; instrumental delivery and episiotomy were also more common among cases when compared to controls. Third degree tear was more common among controls and this was statistically significant. However, multivariate analysis did not reveal IOL as an independent risk factor [Table/Fig-2b]. BMI >30 kg/m^2 and anaemia were more common in controls on multivariate analysis. Median duration of hospital days (IQR) with women who delivered vaginally was 7.5 (5,10) days in cases and 4 days (3,5.5) in controls and this was statistically significant {OR 1.63 (1.42,1.88) p≤.001}. 22 cases (25.5%) who delivered vaginally were given antibiotics while 3 controls (1.7%) were given antibiotics empirically. Of the women on antibiotics (n=22) one third were given ampicillin, gentamycin and metronidazole, another third were given Piperacillin, Tazobactam and metronidazole. Others were given ampicillin, gentamycin and metronidazole and upgraded to second line drugs i.e., Piperacillin, Tazobactam and metronidazole.

Variables	Cases n=86	%	Controls n=169	%	p-value
Age >30 (in years)	11	12.8	20	11.6	0.79
Primi	77	89.5	114	66.3	<0.001
Gestational age <37 weeks	8	9.3	26	15.1	0.19
BMI >30 kg/m^2	14	15.5	45	27.1	0.06

[Table/Fig-1]: Demographic characteristics of perineal wound dehiscence following vaginal delivery.

Variables	Cases (n=86) n (%)	Controls (n=169) n (%)	95% CI (Cases-controls)	p-value
Anaemia	9 (10.47)	35 (20.71)	0.45 (0.20, 0.98)	0.040
Gestational diabetes mellitus	15 (17.44)	29 (16.86)	1.04 (0.52, 2.06)	0.907
Hypertension diseases	13 (15.12)	15 (8.72)	1.8 (0.84, 4.11)	0.124
Induction of labour	46 (53.49)	67 (38.95)	1.80 (1.06, 3.04)	0.027
PROM	10 (11.63)	32 (18.60)	0.57 (0.26, 1.23)	0.156
>3 vaginal examination	10 (11.63)	9 (5.29)	2.35 (0.91, 6.03)	0.075
Duration of labour >18 hours	4 (4.65)	9 (5.23)	0.88 (0.26, 2.95)	0.841
Amnioinfusion	8 (9.30)	10 (5.81)	1.66 (0.63, 4.37)	0.304
Intrapartum chorioamnionitis	(2.33)	0 (0.0)	-	-
MSAF	25 (29.07)	20 (11.63)	3.11 (1.61, 6.01)	0.001
Episiotomy	86 (100)	134 (77.9)	-	<0.001
PPH	11 (12.79)	15 (8.72)	1.53 (0.67, 3.50)	0.309
3rd degree tear	11 (12.79)	40 (23.26)	0.48 (0.23, 0.99)	0.050
Instrumental delivery	62 (72.09)	54 (31.4)	5.65 (3.19, 9.99)	<.001

[Table/Fig-2a]: Antepartum and Intrapartum risk factors associated with perineal wound dehiscence following vaginal delivery.

Variable	Adjusted OR (95% CI)	p-value
BMI >30 kg/m^2	0.26 (0.11-0.63)	0.003
Primi	2.86 (1.23-6.66)	0.015
Instrumental deliveries	5.21 (2.7-10.00)	<0.001
MSAF	0.37 (0.17-0.81)	0.012
>3 vaginal examinations	0.73 (0.26-2.08)	0.560
Anaemia	0.38 (0.15-0.98)	0.050
PROM	0.53 (0.21-1.33)	0.160
Induction of labour	1.35 (0.71-2.56)	0.350

[Table/Fig-2b]: Antepartum and Intrapartum risk factors associated with perineal wound dehiscence following vaginal delivery multi-variate analysis.

The number of WD following CD was 94 (2%). The baseline characteristics are presented in [Table/Fig-3]. Age of the woman and the gestational age at delivery were similar in cases and controls. Significantly more number of primis were seen in cases when compared to controls. BMI >30 kg/m^2 was significantly more common among cases as compared to controls. Women with previous LSCS were significantly more common among controls. Among the antenatal and intrapartum risk factors, hypertensive diseases and IOL were significantly more common among cases as compared to controls. This association was not seen in multivariate analysis [Table/Fig-4a,b]. Median duration of hospital stay in cases who delivered by CD was 6 days (5,12) and 5 days (4,7) in controls. This was also statistically significant {OR 1.27 (1.17,1.38) p≤001}. Post CD antibiotics was given in 50 of cases (52.63%) and only 20 controls (10.52%) p=.002. of cases in the women who needed antibiotics 30% were given ampicillin, gentamycin and metronidazole and another 30% were given Piperacillin, Tazobactam and metronidazole and the rest were given sequential antibiotics i.e., first started with ampicillin, gentamycin and metronidazole which was subsequently upgraded to Piperacillin, Tazobactam and metronidazole. Meropenen was used in only one case in each of the deliveries.

Variables	Cases n=94	%	Controls n=187	%	p-value
Age >30 (in years)	22	23.2	43	22.6	0.920
Primi	66	69.5	109	57.4	0.048
Gestational age <37 weeks	36	37.9	61	32.1	0.330
BMI >30 kg/m^2	41	43.6	53	29.6	0.020

[Table/Fig-3]: Demographic characteristics of wound dehiscence following Caesarean delivery.

Variables	Cases (n=94) n%	Controls (n=187) n%	95% CI (Cases-controls)	p-value
Anaemia	15 (15.96)	34 (18.18)	0.85 (0.43, 1.66)	0.643
Gestational diabetes mellitus	25 (26.32)	61 (32.11)	0.75 (0.43, 1.30)	0.316
Hypertension diseases	26 (27.37)	27 (14.21)	2.27 (1.23, 4.17)	0.008
Induction of labour	43 (53.09)	59 (34.91)	2.10 (1.23, 3.61)	0.007
PROM	15 (15.79)	25 (13.16)	1.23 (0.61, 2.47)	0.547
>3 vaginal examination	9 (9.47)	23 (12.17)	0.75 (0.33, 1.70)	0.499
Duration of labour >18 hours	12 (12.63)	15 (7.98)	1.66 (0.74, 3.72)	0.212
Amnioinfusion	4 (4.21)	10 (5.26)	0.79 (0.24, 2.59)	0.699
Intrapartum chorioamnionitis	10 (10.53)	9 (4.74)	2.36 (0.92, 6.03)	0.072
MSAF	16 (17.02)	23 (12.11)	1.48 (0.74, 2.97)	0.259
PPH	6 (6.32)	7 (3.68)	1.76 (0.57, 5.39)	0.321
Emergency LSCS	80 (84.21)	171 (90.0)	0.59 (0.28, 1.22)	0.158
Intraparietal adhesions	4 (4.21)	13 (6.84)	0.59 (0.18, 1.88)	0.381

[Table/Fig-4a]: Antepartum and Intrapartum risk factors associated with wound dehiscence following caesarean delivery.

Variable	Adjusted OR (95% CI)	p-value
Primi	0.68 (0.27-1.7)	0.400
BMI >30 kg/m^2	1.1 (0.57-2.53)	0.630
Previous LSCS	0.4 (0.15-1.15)	0.090
Hypertension	1.9 (0.9-4.0)	0.090
Induction of labour	1.48 (0.79-2.77)	0.220
Duration of ROM	1.7 (0.73-3.9)	0.220
Intrapartum chorioamnionitis	1.8 (0.65-4.9)	0.260

[Table/Fig-4b]: Antepartum and Intrapartum risk factors associated with wound dehiscence following caesarean delivery - Multi-variate analysis.

DISCUSSION

The present study found a WD rate of 0.8% following VD as seen in other studies [1]. One of the salient findings of this study was that IOL was significantly more common among cases when compared to controls in women who delivered vaginally. Meconium-stained amniotic fluid was more common among cases and this could be related to the long labour and the use of misoprostol with IOL [17]. WD was significantly more common with instrumental delivery and episiotomy as seen with other studies [3]. However, multivariate analysis did not show IOL as an independent risk factor.

Among the women who had CD, 2% had WD and this was similar to other studies [2]. The salient findings in this group were that IOL and BMI more than 30 were significantly more common among the cases when compared to controls. Hypertensive diseases were more common among cases as seen in an earlier study [18] and this could be related to the fact that IOL is more common in women with hypertensive disease. The association of induction of labour and WD has been described in only few studies [19]. Association of WD and BMI >30 kg/m^2 following CD has been described in several other studies [20]. However, association of IOL and BMI >30 kg/m^2 with WD in cases of CD were not seen in multivariate analysis in the present study. In both modes of delivery, primi gravida was more common among cases and this could be attributed to the fact that most multi-gravida has a short and easy intrapartum period with a decreased need of episiotomy or with decreased incidence of vaginal tears. Authors had some surprising findings in the present study some of which were misleading and related to the small sample size. For example, significantly more controls who had CD had anaemia in the antenatal period compared to cases of WD [21]. Authors found a high rate of third degree tears in controls which were 23.6% of all deliveries unlike 9% described in other centres [22]. More women with previous cesarean sections were found in controls and this was also an unusual finding. On multivariate analysis, BMI >30 kg/m^2 was found to protect WD in cases of VD. Since, this is not biologically plausible or coherent; this unusual finding can be attributed to the small sample size.

WD generally develops within 4 to 7 days after cesarean delivery [4,23]. The organisms causing SSI is usually A or B beta-hemolytic streptococcus or genital mycoplasm as [23,24]. These WD is not always treated with antibiotics after the wound is opened up since not all wounds are infected [22]. Antibiotics are indicated only in cases with cellulitis [25]. Postnatal hospital stay and antibiotic therapy in both modes of delivery were as expected in all cases of WD when compared to controls in the present study.

LIMITATION

The strength of present study was that data was collected from a register that had information documented meticulously. However, as with any retrospective study, there are several limitations. Even though most women returned to present institution in the event of a complication, there may be under reporting especially of WD that occurs after discharge. Peripartum WD is more common with IOL. WD with VD was associated with meconium stained amniotic fluid, instrumental delivery and episiotomy. WD with CD was also associated with BMI more than 30. Careful assessment of indication for IOL is vital and is necessary to decrease the incidence of WD. Women who are obese or are undergoing IOL should be counselled in detail about the increased chance of WD.

CONCLUSION

An association between IOL, primigravidae, instrumental delivery and MSAF was seen with peripartum WD.

REFERENCES

[1] Berkowitz LR. Postpartum perineal care and management of complications. UptoDate, Brubaker, L. and Lockwood, C.(Eds), UptoDate, Waltham, MA. 2017.
[2] Berghella, Vincenzo, C. Lockwood, and V. Barss. "Cesarean delivery: Postoperative issues." (2015). Uptodate.
[3] Macleod M, Strachan B, Bahl R, Howarth L, Goyder K, Van de Venne M. Murphy D. A prospective cohort study of maternal and neonatal morbidity in relation to use of episiotomy at operative vaginal delivery. BJOG: An International Journal of Obstetrics & Gynaecology. 2008;115:1688-94.
[4] American College of Obstetricians and Gynecologists. Practice Bulletin No. 165: Prevention and management of obstetric lacerations at vaginal delivery. Obstetrics and gynecology. 2016;128(1):e1.
[5] Ketcheson F, Woolcott C, Allen V, Langley JM. Risk factors for surgical site infection following cesarean delivery: a retrospective cohort study. CMAJ Open. 2017;5(3):E546.
[6] Olsen MA, Butler AM, Willers DM, Devkota P, Gross GA, Fraser VJ. Risk factors for surgical site infection after low transverse cesarean section. Infection Control & Hospital Epidemiology. 2008;29(6):477-84.
[7] Temming LA, Raghuraman N, Carter EB, Stout MJ, Rampersad RM, Macones GA, et al. Impact of evidence-based interventions on wound complications after cesarean delivery. American Journal of Obstetrics & Gynecology. 2017;217(4):449-e1.
[8] Abalos E, Addo V, Brocklehurst P, El Sheikh M, Farrell B, Gray S, et al. Cesarean section surgical techniques (CORONIS): a fractional, factorial, unmasked, randomised controlled trial. Lancet (London, England). 2013;382(9888):234-48.
[9] Hammad IA, Chauhan SP, Magann EF, Abuhamad AZ. Peripartum complications with cesarean delivery: a review of Maternal-Fetal Medicine Units Network publications. J Matern Fetal Neonatal Med. 2014;27:463.
[10] Roberts SC, Maccato M, Faro SA, Pinell PH. The microbiology of post-cesarean wound morbidity. Obstetrics and Gynecology. 1993;81(3):383-86.
[11] Carroli G, Belizan J. Episiotomy for vaginal birth. The Cochrane Database of Systematic Reviews. 2000(2):CD000081.
[12] Frankman EA, Wang L, Bunker CH, Lowder JL. Episiotomy in the United States: has anything changed? Am J Obstet Gynecol. 2009;200:573.e1-7. (Level II-3)
[13] Murphy DJ, Macleod M, Bahl R, Goyder K, Howarth L, Strachan B. A randomized

controlled trial of routine versus restrictive use of episiotomy at operative vaginal delivery: a multicentre pilot study. BJOG. 2008;115:1695-702; discussion 1702-3 (Level-I)
[14] Carter EB, Temming LA, Fowler S, Eppes C, Gross G, Srinivas SK, et al. Evidence-based bundles and cesarean delivery surgical site infections: a systematic review and meta-analysis. Obstetrics & Gynecology. 2017;130(4):735-46.
[15] Mackeen Ad, Packard RE, Ota E, Berghella V, Baxter JK. Timing of intravenous prophylactic antibiotics for preventing postpartum infections morbidity in women undergoing cesarean delivery. The Cochrane Database of Systematic Reviews. 2014;12:CD009516.
[16] ACOG Practice Bulletin No.120: Use of prophylactic antibiotics in labour and delivery. Obstet Gynecol. 2011;117(6):1472-83.
[17] Hofmeyr GJ, Gulmezoglu AM, Alfirevic Z. Misoprostol for induction of labour: a systematic review. BJOG: An International Journal of Obstetrics & Gynaecology. 1999;106(8):798-803.
[18] Schneid-Kofman N, Sheiner E, Levy A, Holcberg G. Risk factors for wound infection following cesarean deliveries. Int J Gynecol Obstet. 2005;90:10-15.
[19] Bailit JL, Gregory KD, Reddy UM, Gonzalez-Quintero VH, Hibbard JU, Ramirez MM, et al. Maternal and neonatal outcomes by labour onset type and gestational age. Am J Obstet Gynecol. 2010;202:245.e1-12.
[20] Anderson V, Chaboyer W, Gillespie B. The relationship between obesity and surgical site infections in women undergoing cesarean sections: an integrative review. Midwifery 2013;29(12):1331-38.
[21] Heughan C, Grislis G, Hunt TK. The effect of anaemia on wound healing. Ann Surg. 1974;179(2):163-67.
[22] Bowler PG, Duerden BI, Armstrong DG. Wound microbiology and associated approaches to wound management. Clin Microbiol Rev. 2001;14:244.
[23] Sarsam SE, Elliott JP, Lam GK. Management of wound complications from cesarean delivery. Obstet Gynecol Surv. 2005;60:462.
[24] Martens MG, Kolrud BL, Faro S, Maccato M, Hammill H. Development of wound infection or separation after cesarean delivery. Prospective evaluation of 2,431 cases. J Reprod Med. 1995;40:171.
[25] Armstrong DG, Meyr AJ, Sanfey H, Eidt JF, Mills JL, Billings JA. Basic principles of wound management. Up to date. 2014.

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