

Risk Factors and Outcomes of Third Degree and Fourth Degree Perineal Tears Compared with First and Second Degree Perineal Tears in a Tertiary Institute in South India

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Abstract

Background: More than 85% of women experience some form of perineal trauma during vaginal birth, with approximately 60% requiring sutures. This study was conducted to compare risk factors and outcomes of third and fourth degree tear with first and second degree tear in Indian population.

Materials and Methods: This observational study included all women with first, second, third, and fourth degree perineal tears. Women with third or fourth degree tears constituted the OASI group, while those with first or second degree tears constituted the Control group. Maternal and fetal risk factors were noted in all patients and OASI and Control groups were compared. All the women were assessed for symptoms like perineal pain, fecal urgency, fecal incontinence to faeces, liquid and gas, and painful defecation at 6 weeks, 3 and 6 months follow-up periods after primary sphincter repair.

Results: There was a significant association of parity, and type of tear, and the odds of having OASI was 4.8 times more in primipara. There was significant association between birth weight above 4kg, shoulder dystocia, prolonged second stage of labour, episiotomy and neonatal head circumference ≥ 35 cm and increased risk of OASI. Perineal pain, need of analgesia, constipation and painful defecation were common complaints in both OASI and Control groups, whereas incontinence to faeces, flatus, liquid and sphincter defect were observed only in OASI group.

Conclusion: Primiparity, instrumental delivery, prolonged second stage of labour, episiotomy, shoulder dystocia, birth weight ≥ 4000 g, and neonatal head circumference ≥ 35 cm are risk factors for OASI in this subset of Indian women.

Keywords: Anal Incontinence, Fecal Incontinence, Fecal Urgency, Obstetric Anal Sphincter Injury, Pregnancy.

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Introduction

Complete perineal tears have been documented since ancient times.[1] The earliest known case of severe perineal injury during childbirth dates back to 2050 BC, found in the mummy of Henhenit, a woman from the harem of Egyptian King Mentuhotep II. Obstetric anal sphincter injuries (OASI), relatively rare, are distressing outcomes of vaginal births. Studies utilizing the WHO's International Classification of Diseases indicate an incidence rate of 4% to 6.6% of all vaginal births, with higher rates in assisted deliveries (6%) compared to spontaneous vaginal deliveries (5.7%).[2-4] More than 85% of women experience some form of perineal trauma during vaginal birth, with approximately 60% requiring sutures.[5] The potential long-term physical and psychological effects, such as pain, fecal incontinence, sexual dysfunction, and lifestyle changes, can lead to

prolonged hospital stays or readmissions for repair. Several risk factors, such as parity[9,10,11,12], large birth weight, shoulder dystocia, prolonged second stage of labour, instrumental delivery, episiotomy and the use of epidural analgesia can increase the risk of perineal trauma. Large prospective studies have shown that up to 25% of primiparous women experience altered faecal incontinence postnatally and up to one third have evidence of some anal sphincter trauma after first vaginal delivery.[6] Despite several studies that have reported risk factors for OASI, data from the Indian subcontinent is scarce. The purpose of this study was to compare risk factors and outcomes of third and fourth degree tear with first and second degree tear in Indian population.

Materials and Methods

This observational study was conducted in OBGY Department. Study included all women with first degree, second degree, third degree, and fourth degree perineal tears with Singleton spontaneous or instrumental vaginal delivery who delivered at term (37weeks to 41weeks), with or without episiotomy and epidural analgesia. Women with intrauterine fetal death, multiple gestations, intact perineum, and preterm deliveries were excluded from the study. Written informed consent was obtained from each participant prior to their enrolment in the study.

First-degree tears were defined as injury extending to the perineal skin and/or vaginal mucosa; Second-degree tears were defined as injury affecting the perineal muscles but not the anal sphincter; Third-degree tears are more severe, involving the anal sphincter complex, and were further categorized into three grades: Grade 3a tears, where less than 50% of the external anal sphincter (EAS) thickness was torn; Grade 3b tears, with more than 50% of the EAS thickness torn; and Grade 3c tears, where both the EAS and internal anal sphincter (IAS) were torn. Fourth-degree tears are the most severe, and were defined as injury involving the perineum, the entire anal sphincter complex (both EAS and IAS), and the anorectal mucosa.

In our study, women with third or fourth degree tears constituted the OASI group, while those with first or second degree tears constituted the Control group. According to literature, among women undergoing vaginal delivery, there is evidence that as the number of risk factors increases, there is 5 times higher incidence of third and fourth degree tears compared to first and second degree tears. As the number of patients with third or fourth degree tears in our study was 100, we took 500 patients

with first or second degree tears in Control group, maintaining a ratio of 1:5. Data collected include age, parity, analgesia, length of passive and active second stage of labour (in minutes), type of delivery (spontaneous, instrumental), whether episiotomy was performed, whether or not shoulder dystocia occurred. Infant related characteristics recorded were birth weight, head circumference and position of baby at delivery in a predesigned proforma. In this study, all women who had OASI were assessed for symptoms like perineal pain, fecal urgency, fecal incontinence to faeces, liquid and gas, painful defecation during the follow-up period at 6 weeks, 3 and 6 months after primary sphincter repair following delivery by utilizing Jorge and Wexner score (Figure 1), wherein, Score 0 signifies 'Perfect' and 20 signifies 'Complete incontinence'.

Statistical Analysis: The statistical significance was evaluated using Chi square test, Fishers exact test, odds ratio and independent sample t tests. p value <0.05 was considered 'statistically significant'.

Results

Of 600 women who delivered vaginally, 415 were primipara and 185 were multipara, among which 21% of primiparous women had OASI, while 5.4% had 1st and 2nd degree tear. There was a significant association between parity and type of tear. The odds of having third- and fourth-degree tear was 4.8 times more in primipara when compared to multi parity. The mean age of study participants was 26.85 and 27.5 years and mean BMI was 27.07 and 25.57 in OASI and Control groups, respectively. (Table 1)

Table 1: Comparison of Maternal Risk Factors between OASI group and Control group

Maternal Risk Factors		OASI group	Control group	Total	Odd's ratio	p value
Parity	MULTI	10(10.0%)	175(35.0%)	185(30.8%)	4.8(1.98-11.82)	< 0.001
	PRIMI	0(90.0%)	25(65.0%)	415(69.2%)		
Age	<20	0	0	0		
	20-24	23	99	122		
	25-29	59	287	346		
	30-34	17	103	120		
	35-39	1	8	9		
	≥40	0	3	3		
Mean age		26.85	27.5			
BMI	<18.5	0	34	34		
	18.5-24.9	201	43	244		
	25-29.9	155	39	194		
	>30	90	18	108		
Mean BMI		27.07	25.57			

Among 600 women, 13 babies were >4kg at delivery, of which 12 belonged to OASI group,

suggesting a significant association between birth weight and type of tear. In our study, Occipito

anterior position was common (98.8%). It was found that the odds of having shoulder dystocia was 7 times higher in OASI group when compared to Control group. Similarly, the odds of having

OASI in fetus with head circumference >35cm was 9.1 times higher when compared to Control group. (Table 2)

Table 2: Comparison of Fetal Risk Factors between OASI group and Control group

Fetal Risk Factors		OASI group	Control group	Total	Test	p value
Birth weight	<4 kg	88(88.0%)	499(99.8%)	587(97.8%)	Fishers exact	<0.001
	>4 kg	12(12.0%)	1(0.2%)	13(2.2%)		
Fetal Position	OA	96(96.0%)	497(99.4%)	593(98.8%)	Fishers exact	<0.007
	OP	4(4.00%)	3(0.60%)	7(1.16%)		
Shoulder Dystocia	NO	93(93.0%)	495(99.0%)	588(98.0%)	Odd's ratio (CI) 7.452 (2.315-23.981)	<0.001
	YES	7(7.0%)	5(1.0%)	12(2.0%)		
Head Circumference	<35cm	87(87.0%)	492(98.4%)	579(96.5%)	Odd's ratio (CI) 9.190 (3.700-22.824)	<0.001
	>35cm	13(13.0%)	8(1.6%)	21(3.5%)		

424 of 600 women delivered spontaneously and 176 delivered through instrumental delivery. There was significant association of type of delivery, prolonged second stage of labour, and episiotomy with type of tear ($p < 0.001$). The odd of having OASI was 3 times more in instrumental delivery, 5 times higher in patients with prolonged second

stage of labour, and 8 times more associated with episiotomy, when compared to Control group patients. However, there was no significant association between epidural analgesia, oxytocin and type of tear between the two study groups. (Table 3)

Table 3: Comparison of Obstetrics Interventions between OASI group and Control group

Obstetrics Interventions		OASI group	Control group	Total	Odd's ratio and Class interval	p value	
Type of Delivery	SVD	43(43.0%)	381(76.2%)	424(70.7%)			
	Instrument Delivery	Forceps	37(37.0%)	63(12.6%)			100(16.7%)
		Ventouse	15(15.0%)	53(10.6%)			68(11.3%)
		Ventouse + Forceps	5(5.0%)	3(0.6%)			8(11.3%)
Epidural	YES	36(36.0%)	224(44.8%)	260(43.3%)	1.443 (0.925-2.251)	>0.05	
	NO	64(64.0%)	276(55.2%)	340(56.7%)			
Duration of Labour	<2hr	58(58.0%)	438(87.6%)	495(82.5%)	5.1 (2.7-9.5)	<0.001	
	>2hr	42(42.0%)	62(12.4%)	104(17.3%)			
Episiotomy	YES	67(67.0%)	100(20.0%)	167(27.8%)	8.12 (4.37-15.08)	<0.001	
	NO	33(33.0%)	400(80.0%)	433(72.0%)			
Oxytocin	YES	62(62.0%)	331(66.2%)	393(65.5%)	1.2 (0.770-1.872)	<0.42	
	NO	38(38.0%)	169(33.8%)	207(34.5%)			

All the patients in Control group, and 92 patients in OASI group were followed up at interval periods 6wks, 3 months, 6 months, while 8 patients lost to follow up in OASI group. Comparison of various outcomes between OASI group and Control group is summarized in Table 4.

Table 4: Comparison of Outcomes between Control group and OASI group

Outcomes		OASI group (n=92)	Control group (n=500)	OR	CI	p value
Pain	6wk	48(52.2%)	51(10.2%)	9.604	(5.8-15.8)	<0.001
	3M	15(16.3%)	8(1.6%)	11.98	(4.9-29.2)	<0.004
	6M	4(4.3%)	0(0%)	Fischer's Exact		<0.001
Analgesia	6wk	4(4.3%)	15(3%)	1.47	(0.47-4.5)	>0.05
	3M	0(0%)	1(0.2%)	Fischer's Exact		>0.05
	6M	-	-	-	-	-
Constipation	6wk	14(15.2%)	22(4.4%)	3.9	(1.91-7.94)	<0.001
	3M	2(2.2%)	4(0.8%)	2.7	(0.49-15.2)	<0.2
	6M	-	-	-	-	-
Painful Defecation	6wk	13(14.1%)	21(4.2%)	3.7	(1.8-7.8)	<0.001
	3M	6(6.5%)	2(0.4%)	17.3	(3.45-87.4)	<0.001
	6M	-	-	-	-	-
Incontinence to Faeces	6wk	3(3.3%)	0(0%)	0.151	(0.125-0.183)	<0.004
	3M	1(1.1%)	0(0%)	0.154	(0.127-0.186)	<0.155
	6M	-	-	-	-	-
Incontinence liquid	6wk	6(6.5%)	0(0%)	Fischer's Exact		<0.001
	3M	6(6.5%)	0(0%)			<0.001
	6M	2(2.2%)	0(0%)			<0.024
Incontinence Gas	6wk	26(28.3%)	0(0%)	Fischer's Exact		<0.001
	3M	17(18.5%)	0(0%)			<0.001
	6M	6(6.5%)	0(0%)			<0.001
Urinary Urgency	6wk	1(1.1%)	2(0.4%)	2.73	(0.24-30.4)	<0.39
	3M	3(3.3%)	0(0%)	Fischer's Exact		<0.04
	6M	-	-	-	-	-
Dysuria	6wk	2(2.2%)	0(0%)	Fischer's Exact		<0.024
	3M	2(2.2%)	0(0%)			<0.024
	6M	-	-			
Wound infection	6wk	0(0%)	4(0.8%)	Fischer's Exact		>0.05
	3M	-	-	-	-	-
	6M	-	-	-	-	-
Wound Gaping	6wk	3(3.3%)	19(3.8%)	0.85	(0.24-20.9)	>0.05
	3M	-	-	-	-	-
	6M	-	-	-	-	-
Per rectal defect	6wk	4(4.3%)	0(0%)	Fischer's Exact		<0.001
	3M	2(2.2%)	0(0%)	Fischer's Exact		<0.05
	6M	--	-			-

Discussion

OASI encompass both third and fourth degree perineal tears. OASI occur when a laceration extends to the anal sphincter and disrupts the anal sphincter musculature (third degree tear), or into the anal mucosa (fourth degree tear). Extensive prospective studies have revealed that as many as 25% of first-time mothers suffer from altered fecal incontinence after childbirth, and up to 33% exhibit signs of some degree of anal sphincter injury

following their initial vaginal delivery.[6] In majority of cases, both these symptoms and injuries are relatively minor and transient, but persistent anal incontinence (including flatus as a sole symptom), faecal incontinence (liquids and solids with or without flatus), fecal urgency can severely diminish quality of life and lead to considerable personal discomfort. We aimed to compare the risk factors and outcomes associated with third and fourth-degree tears (OASI group) versus first and

second-degree tears (Control group) in the Indian population.

Maternal Risk Factors

Our study showed that the odds of having OASI was 4.8 times more in Primipara when compared to Multiparity, (Table 1) which is in accordance with the previous study by Handa VL et al[7], wherein the odds of having OASI was 3.24 times more in Primipara when compared to Multiparity. Out of 100 women with OASI, we had 3 women with previous history of OASI, among which 2 women had recurrence of OASI. In our study, most of the women belonged to age group 25-29 with the mean maternal age of being 27.5 and 26.8 in OASI and Control groups, respectively. Similar observations were made by Raisanen SH et al[8] in their study. In our study, mean maternal BMI in OASI and Control groups were 27.07 and 25.57. We did not find any significant association of BMI with higher risk of OASI, similar to the study by Raisanen SH et al[8]. However, one study found that BMI >30 among nulliparous women (aOR 0.8-0.7) was related with reduced risk of OASI.[9] Previously, an increased OASIS risk among both African (aOR 1.3) and Asian women (aOR 1.6) as compared to European women was suggested by Baghestan E et al[10] et al in their study. In our study, all the participants were of Indian origin.

Fetal Risk Factors

In our study, 12% women had OASI with infant weight >4000gm and there was a significant association between birth weight and type of tear. (Table 2) De Leuw JW et al[11] observed that infant weight >4000g was associated with OASI in 1.4% women. However, another study stated that even though the risk of OASI is increased when the baby is large, majority (70-90%) of OASIS occurs in deliveries with an infant less than 4000 grams [3,9,46,48,53,54] and 52%-56% in deliveries with infant birth weight below 3500 grams.[12] Persistent occipito posterior (OP) presentation increases the risk of OASI markedly.[8] In our study, only 4% of women had OP position and 96% had occipito anterior position in OASI group. However, due to low incidence (2%), persistent OP presentation contributes to a minor fraction of all OASI cases.[8,13] Previous studies have shown that shoulder dystocia is associated with increased risk of OASI with a high aOR of 2.0-2.67.[7,11] Similarly, we observed that odds of having OASI was 7 times higher with shoulder dystocia. Additionally, we found that odds of having OASI was 9.1 times higher when head circumference was more than 35cm.

Obstetrics Intervention:

43% of our patients with OASI had spontaneous vaginal delivery (SVD) and 57% had assisted

vaginal delivery (AVD). Amongst the 57% with AVD, 37% had forceps, 15% had ventouse and 5% had sequential instruments. The odds of having OASI was 3 times more in instrumental delivery when compared to SVD, suggesting statistical significance ($p < 0.001$). Forceps delivery was shown to represent a higher risk for OASI than a vacuum extraction, as concluded in a Cochrane review based on 10 randomized trials⁵⁷. Similarly, in large register studies, incidences of OASI were higher in forceps deliveries (8.1-16%), than in deliveries by vacuum extraction (6.01-5.5%).[7,10,12] In our study, 14% of women who received epidural analgesia had OASI. Lower risk of OASI associated with epidural use in our study might be due to more controlled crowning and delivery of head with resulting fewer lacerations. The effect of epidural has been shown to be indifferent in parity groups[8], or have only slightly increasing [10], or decreasing[11] or no effect[7] after adjustment for other OASI risk factors. In our study, prolonged second stage of labour (>2 h) was significantly associated with higher risk of OASI, increasing the odds by 5 times. As per RCOG prolonged second stage of labour (2-3 h) had Relative risk of 1.47. As per SOGC prolonged second stage of labour (>1 h) with odds ratio 1.5. In our study, of 100 women with OASI, 67 women had episiotomy suggesting a significant association of OASI with episiotomy, with an OR of 8.12 ($p < 0.001$). The American and Canadian guidelines^{66, 102} reported increased risk of OASI with midline episiotomies, but in our cases, all episiotomies were mediolateral. Previous studies have observed lower rates of OASI in women undergoing episiotomy. [14,15] However, Priyankur[16] stated that episiotomy did not offer protection against sustaining severe perineal lacerations. We did not find any significant association between oxytocin and type of tear, whereas, oxytocin augmentation was associated with a higher OR of OASI during spontaneous deliveries of normal-size infants in the study by Astrid[17]. Effects of induction of labor and oxytocin on prevalence of OASIS are conflicting, and there is probably no effect on OASI risk.[8,10,12]

Outcomes

Study population consisted of 100 women with OASI and 500 women with 1st and 2nd degree tear (Control group), of which 8 OASI women lost to follow up. All patients with OASI were followed for 6 months clinically, and those who failed to comply were approached by telephone questionnaire. In our study, perineal pain, need of analgesia, constipation and painful defecation were common complaints in both OASI and Control groups, whereas incontinence to faeces, flatus, liquid and sphincter defect were observed only in

OASI group and wound gaping with or without wound infection was observed more in Control group compared to OASI group, however none of our patients needed secondary suturing. During follow up, incontinence to faeces was reported in 3.3% women at 6wks and 1.1% of women at 3months with OASI and none at 6 months; incontinence to liquid was observed in 6.5% at 6wks to 3 months and 2.2% at 6 months. The postpartum prevalence of fecal incontinence among women with OASI was 7.8-17% as compared to women without OASI (2.9-8%) in a study by Guise JM et al[18]. Similarly, Nichols CM et al[19] found that flatal incontinence was more common among women with OASI (23-45%) than in women without such injury(18-20%). Study by Brincat C et al[20], revealed that the increased prevalence of fecal, flatal or anal incontinence shortly (6wks-5 months) after delivery, are reduced at follow-up of longer time interval after delivery. This could indicate that pelvic floor injuries can heal during the first year after delivery to some extent. In contrast to these findings, Nazir M et al[21] observed increasing fecal incontinence from 7% to 17% during repeated surveys at 5 and 18 months postpartum. Follow-up studies by Faltin DL et al[22] and Fornell EU et al[23] 5-18 years after delivery reveal that women with OASI still have higher prevalence of anal incontinence than controls without OASIS. Urinary incontinence (urgency, frequency) and dysuria were reported more in OASI group in our study. Out of 3 patients with previous OASI without residual symptoms, opted for vaginal delivery, and 2 had rOASI. Both women with rOASI were asymptomatic at 6months following primary repair.

Conclusion

This study showed that even temporary anal incontinence after a third and fourth degree tear can be a predictive factor for anal incontinence after subsequent vaginal deliveries. These women should be assessed by anal endosonographic and physiological tests before next delivery. Any woman who has symptoms or major sphincter defects should be offered a caesarean section. In the presence of minor defects, a potentially traumatic vaginal delivery should be avoided. To conclude, primiparity, instrumental delivery, prolonged second stage of labour, episiotomy, shoulder dystocia, birth weight ≥ 4000 g, and neonatal head circumference ≥ 35 cm are risk factors for OASI in this subset of Indian women. There was a significant increase of perineal pain, anal incontinence to liquid and flatus at the end of 6 months in patients with OASI in this study.

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