

Continuous Versus Interrupted Sutures for Musculofascial Perineal Repair of Episiotomy

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Abstract: Aim: To compare the effects of continuous versus interrupted sutures as regard short-term postpartum maternal morbidity following perineal repair after vaginal delivery. **Material and Methods:** The study carried out during August 2017 to February 2018 at the Obstetrics and Gynecology Department of El-Hussein University Hospital included 400 pregnant women. Subjects were admitted for the first vaginal labour and were underwent a mediolateral episiotomy after vaginal delivery. They were randomly allocated into two groups A and B. **Results:** The results showed that there were highly statistically significant difference could be detected between continuous and interrupted groups as regard length of threads used by centimetres, time of wound suturing, perineal pain at 12 hours 48 hours measured by VAS scales, need for analgesia up to 48 hours after delivery, time of wound healing, time of dyspareunia after 2 months and the time of dyspareunia after 4 months. **Conclusion:** a Continuous knotless technique for perineal repair is associated with less time of wound suturing, time of wound healing, length of threads used by centimetres, perineal pain at 12 hours, 48 hours and ten days, need for analgesia and lower VAS scores than techniques with interrupted sutures. Indeed, the introduction of a continuous suturing policy would provide more comfortability; less suturing materials, less time for repair and less analgesia are needed than for the interrupted method of repair.

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1. Introduction

Eighty-five percent of women who have a spontaneous vaginal birth will have some form of perineal trauma and up to 69% will need to have sutures (Kettle and Tohill, 2008; Smith et al., 2013).

Maternal factors that may contribute to the extent of trauma sustained during childbirth are ethnicity, age, tissue type and nutritional state in the pregnancy years (Dunn et al., 2015).

Other risk factors include primiparity, fetal birth weight greater than 4000 g, instrumental delivery, direct occipitoposterior position and precipitate birth. Antenatal perineal massage may reduce the risk of perineal damage (Dahlqvist and Jonsson, 2017).

In addition, aspects of intrapartum care, such as support during labour, a position for delivery, type of pushing, mode of delivery and the use or not of episiotomy, all have a direct effect on both the prevalence and degree of perineal damage sustained during childbirth (Bulchandani et al., 2015).

Morbidity associated with childbirth may affect women's physical, psychological and social well-being, both in the immediate and long-term postnatal period. Pain and discomfort related to perineal trauma have been reported to interfere with women's daily activities postpartum, such as sitting, walking and lifting the baby (Priddis, Schmied and Dahlen, 2014).

Pain related to perineal trauma and suturing is known to have a negative impact on sexual activities in the first year after childbirth (Priddis, Schmied and Dahlen, 2014). Obstetricians increasingly face women who wish to have a caesarean section due to fear of genital tract injuries or following previous childbirth-related trauma (Kindberg et al., 2008; Aslam et al., 2015).

Complications depend on the severity of perineal trauma and on the effectiveness of treatment. The type of suturing material, the skill of the operator and the technique of repair are the 3 main factors that influence the outcome of perineal repair. Surgical repair of lacerations in the genital area is performed by obstetricians according to extent of trauma. Trauma involving the vaginal mucosa, perineal skin and superficial perineal muscles are defined as first- or second-degree injuries. Lacerations involving the anal sphincter are defined as third-degree tears and of the anal mucosa as fourth-degree tears (Frohlich and Kettle, 2015).

Choice of suture material for repair, suture technique and the operator's surgical competence can influence the short and long-term morbidity related to perineal repair (Green-top Guideline NO.29, 2015).

Rapidly absorbed synthetic materials are reported to be superior to monofilament sutures and other synthetic products with slower absorption when

perineal pain and wound healing are evaluated (**Dencker et al., 2002; Kettle et al., 2006**).

Pain can also be reduced if the perineal skin is not sutured (**Kettle and Tohill, 2008**). In relation to suture techniques, a continuous suture technique for approximating second-degree lacerations and episiotomies seems to be less painful and causes less need for subsequent suture material removal than interrupted stitches, including the closure of the perineal skin (**Green-top Guideline NO.29, 2015**).

Results of a systematic review of 4 randomized controlled trials (**Johanson and Kettle et al., 2000**) consisting of 1864 primiparous and multiparous women, showed that continuous subcutaneous techniques of perineal skin closure were associated with less short-term pain than interrupted transcutaneous stitches (**Maged Ramadan Abu Seada; Borg, Tamer Farouk; Samy, 2018**).

However, these 4 studies analyzed techniques only for skin closure. To compare the effects of continuous versus interrupted sutures as regard short-term postpartum maternal morbidity following perineal repair after vaginal delivery regarding wound infection, wound healing, length of threads used by centimetres, time of intervention, dyspareunia, postpartum pain and blood loss. To test this hypothesis, a double-blind randomized controlled clinical trial in healthy was conducted, low-risk laboring women requiring surgical repair of second-degree perineal lacerations and episiotomies.

2. Patients and Methods

Settings:

The study carried out during August 2017 to February 2018 at the Obstetrics and Gynecology Department of El-Hussein University Hospital included 400 pregnant women. Subjects were admitted for the first vaginal labour and were underwent a mediolateral episiotomy after vaginal delivery. The patients were chosen to participate in the study after obtaining a verbal consent. They were randomly allocated into two groups A and B. **Group A:** was repaired by continuous suturing technique and include 200 pregnant women. **Group B:** was repaired by interrupted suturing technique and include 200 pregnant women.

Selection Criteria:

The inclusion criteria:

Pregnancy more than 37weeks, First vaginal delivery, Average birth weight not more than 4kg, and Average for gestational age.

The exclusion criteria:

Instrumental vaginal delivery, Previous perineal surgery, the Preexisting medical condition that might adversely affect healing, example diabetes mellitus, Complicated mediolateral episiotomy, Anemia with

haemoglobin level lesser than 9g/dl, Coagulation abnormalities, Postpartum haemorrhage, Delivery conducted outside the hospital and Varicosities.

- The choice of the suture technique was concealed from the patient.

Management of the second stage of labour:

When the cervix was fully dilated and head at station "zero" (the lowest portion of the occiput is at the level of the maternal ischial spines) the patient was transferred to the delivery room. They were placed in the lithotomy position, encouraged to bear down during the uterine contractions and rest in between them. Slow controlled delivery of the head, maintaining head flexion using (**modified Ritgen's manoeuvre**), and delivery of the shoulders one at a time, the anterior then the posterior, by lateral flexion of the body.



Figure 1: The instruments used in repairing the perineum.

The technique of the episiotomy:

Episiotomy, when indicated, was done mediolateral, at the time of head crowning, using a local anaesthesia (10 cm xylocaine), performed with scissors. There was an assessment of all genital tract for the presence of extended episiotomy, perineal tears and its degree. The standard suture material in the study was absorbable (ETHICON coated vicryl polyglactin 910 violets braided absorbable suture No two-zero, Manufacturer Jhonson and Jhonson Intl).

The episiotomy in group A:

Included women whose episiotomies were repaired by Continuous suture technique. The continuous suturing technique is a loose, continuous nonlocking suture to close the vaginal mucosa and the muscular layer of the perineum. The perineal skin is approximated with the same continuous suture in the subcutaneous tissue a few millimetres under the perineal skin edges, finishing with a terminal knot in the vaginal mucosa in front of the hymenal ring.

The Episiotomy in group B: was closed using the interrupted suture (IT) which involves placing three layers of sutures: a continuous non-locking stitch to close the vaginal epithelium. commencing above

the apex of the wound and finishing at the level of the fourchette; three or four interrupted sutures to re-approximate the deep and superficial perineal muscles, and interrupted transcutaneous technique to close the skin.

For each patient, the time needed for suturing was estimated, length of vicryl threads needed for repair and amount of blood loss during the repair measured by number of soaked gauze towels during the repair. During the first 12 hours following the delivery, each patient was followed up for the hematoma formation in the wound and perineal pain measured by visual analogue scale (VAS). At 48 hours and ten days after delivery, each patient was followed up for perineal pain measured by visual analogue scale (VAS). The need for analgesia up to 48 hours after delivery, wound dehiscence and infection. The need for suture removal.

Wound infection was diagnosed by symptoms of wound infection as pain, fever and abnormal discharge from the wound, all patients were asked about these

symptoms and were examined for persistent hyperemia, in duration, and tenderness of the wound and possibly purulent discharge along with fever.

Statistical analysis:

Data were analyzed using Statistical Program for Social Science (SPSS) version 18.0. Quantitative data were expressed as the mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

Ethical consideration:

Agreement for this study was obtained from the hospital's ethical committee, and an informed oral and written consent were taken from all patients included in the study prior surgery after a very clear explanation of both procedure, adequate providing of information about the study necessities, purpose, and dangers.

3. Results

Four hundred women were selected to receive episiotomy in the second stage of labour either by Continuous or Interrupted suture technique (n=400).

Table 1: Difference between Study Groups Concerning Indicators of Intraoperative Blood Loss.

Indicators of Intraoperative Blood Loss		Group I	Knotless	Group II	Technique	p*
		Continuous		Interrupted		
Postoperative Hemoglobin Fall (g/dl)	Range	0.2 – 0.5		0.3 – 0.8		< 0.001
	Mean ± SD	0.36 ± 0.06		0.56 ± 0.08		Highly Significant
Postoperative Hematocrit Fall	Range	0.1 – 3.9		0.4 – 7.8		< 0.001
	Mean ± SD	1.03 ± 0.46		1.82 ± 1.0		Highly Significant
Estimated Blood Loss (ml)	Range	250 – 400		375 – 600		< 0.001
	Mean ± SD	320.03 ± 26.93		451.51 ± 44.09		Highly Significant

There was a statistically significant more intraoperative blood loss in the interrupted group than the continuous knotless group, denoted by significantly higher mean fall in haemoglobin concentration.

Table 2: Comparison between both groups as regard Length of threads used by cm.

	length of threads used by cm						T-test	
	Continuous			Interrupted			t	P-value
Range	62	-	85	79	-	112	21.803	<0.001* H.S
Mean±SD	76	±	6.3	98	±	12.9		

There was highly statistically significant difference detected between continuous and interrupted groups as regard length of threads used by cm that it was higher in the interrupted group compared to continuous group (mean ±SD: 76±6.3 vs 98±12.9, t=21.803, P<0.01) by using unpaired t-test.

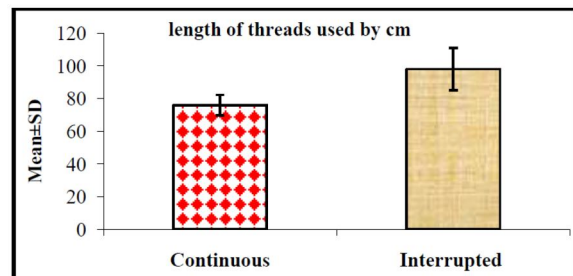


Figure 2: Comparison between both groups as regard length of threads used by cm.

Table 3: Comparison between both groups as regard time of wound suturing

	Time of wound suturing					T-test	
	Continuous		Interrupted			t	P-value
Range	10	-	17	12	-	25	15.929 <0.001* H. S
Mean±SD	12.2	±	2.6	17.35	±	3.78	

There was highly statistically significant difference detected between continuous and interrupted groups as regard time of wound suturing that interrupted group had more time of wound suturing compared to continuous group (mean ±SD: 12.2±2.6 vs 17.35±3.78, t=15.929, P<0.01) by using unpaired t-test.

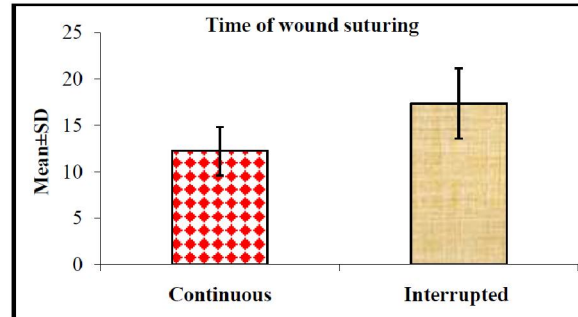


Figure 3: Comparison between both groups as regard time of wound suturing.

Table 4: Comparison between both groups as regard time of wound healing

	Time of wound healing (wks)					T-test	
	Continuous		Interrupted			t	P-value
Range	4.5	-	7	5.2	-	9	15.298 <0.001* H.S
Mean±SD	5.19	±	1.1	6.8	±	1	

There was highly statistically significant difference detected between continuous and interrupted groups as regard time of wound healing that interrupted group had more time of wound healing compared to continuous group (mean ±SD: 5.19±1.1 vs 6.8±1, t=15.298, P<0.01) by using unpaired t-test.

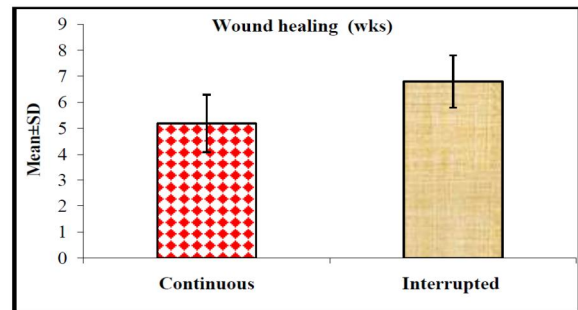


Figure 4: Comparison between both groups as regard time of wound healing.

Table 5: Comparison between both groups as regard dyspareunia after 2 months

Dyspareunia after 2 months	Continuous N= 204	Interrupted N=196	X ²	P
Negative	170(83.3%)	116(59.2%)	27.436	<0.001* H.S.
Positive	34(16.7%)	80(40.8%)		

There was highly statistically significant difference detected between continuous and interrupted groups as regard dyspareunia after 2 months that interrupted group had a higher incidence of dyspareunia compared to continuous group (Negative 83.3% vs 59.2% - Positive 16.7% vs 40.8% X²=27.436, P<0.01) by using chi-square test.

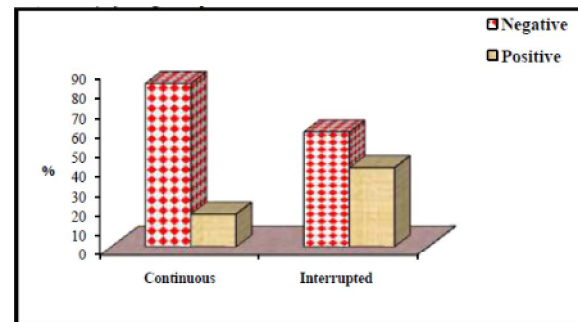


Figure 5: Comparison between both groups as regard dyspareunia after 2 months.

Table 6: Comparison between both groups as regard dyspareunia after 4 months

Dyspareunia after 4 months	Continuous N= 204	Interrupted N=196	X ²	P
Negative	200(98%)	154(78.6%)	35.335	<0.0001* H.S
Positive	4(2%)	42(21.4%)		

There was a highly statistically significant difference detected between continuous and interrupted groups as regard dyspareunia after 4 months that interrupted group had a higher incidence of dyspareunia compared to the continuous group.

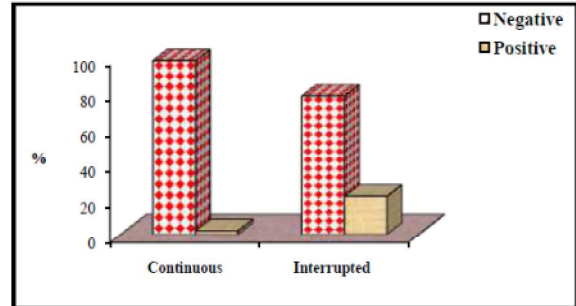


Figure 6: Comparison between both groups as regard dyspareunia after 4 months.

Table 7: Comparison between the two studied groups regarding the need for analgesia up to 48 hours

Need for analgesia	Continuous		Interrupted		X ²	p-value
	No.	%	No.	%		
Yes	40	20	78	39	16.456	<0.001* H.S.
No	160	80	122	61		
Total	100		100			

*Highly significant difference

Table (7) shows the comparison between the two studied groups regarding need of analgesia, it was found that there was a highly significant increase in the number of patients need analgesia in interrupted

technique than the continuous (39% of the patient need analgesia in interrupted, while only 20% need analgesia in continuous).

Table 8: Comparison between the two studied technique regarding the perineal pain at 48 hours and after ten days

Perineal pain	Continuous		Interrupted		X ²	p-value
	No.	%	No.	%		
After 48 hours:					44.878	<0.001* H.S.
▪ Yes	102	51	166	83		
▪ No	98	49	34	17		
After 10 days:					30.692	<0.001* H.S.
▪ Yes	60	30	116	58		
▪ No	140	70	84	42		
Total	200		200			

**Highly significant difference

Table (8) shows the comparison between the two studied techniques regarding the perineal pain at 48 hours and after ten days, it was found there was a

highly significant increase in the number of patient had a perineal pain after 48 hours and after ten days than the patients in the continuous group.

Table 9: Comparison between the two studied groups regarding visual analogue scale (VAS) at different period of follow-up

VAS		Continuous	Interrupted	t-test	p-value
After 12 hours	±S.D	3.21	5.65	3.25	0.002*
	Mean	1.65	2.06		
After 48 hours	Mean	3.05	5.22	3.69	0.001*
	±S.D	1.71	2.11		
After ten days	Mean	1.81	2.98	1.05	0.103
	±S.D	1.06	1.85		

Table (9) shows a comparison between the two studied groups regarding visual analogue scale (VAS) at different period of follow-up. In women who reported pain, there were lower VAS pain scores in the continuous than in the interrupted (the mean at 12 hours for continuous 3.21 versus 5.65 for the interrupted group, 3.05 versus 5.22 at 48 hours and 1.818 versus 2.98 at ten-day). So there is a highly significant difference after 12 hours and after 48 hours, but there is no significant difference after ten days.

4. Discussion

This study was designed to compare the effects of continuous versus interrupted sutures as regard short-term postpartum maternal morbidity following mediolateral episiotomy repair after vaginal delivery regarding, perineal pain, amount of blood loss during the repair, the time needed for suturing, length of threads used by centimeters, wound infection, the need for suture removal and hematoma formation.

In the present study, the mean participant's age in the continuous group was 25.1 + 5.03 and in the interrupted group was 24.2+4.68. As regard parity, the incidence of primiparity was 73.5 and 69.4% in continuous group and interrupted group respectively.

None of these groups revealed any statistical significant differences indicating that the two groups were well matched. The results showed that there was highly statistically significant difference detected between continuous and interrupted groups as regard length of threads used by centimetres that it was higher in the interrupted group compared to continuous group (mean \pm standard deviation: 74.5 \pm 7.11 versus 97.2 \pm 11.9).

The results agreed with previous studies including **Valenzuela et al.**, who reported that continuous group needed fewer suture materials while **Kettle et al.**; **Morano et al.**, did not include length of threads used by cm as a parameter for the comparison between continuous and interrupted suturing techniques (**Valenzuela et al., 2009; Perumal and Selvaraju, 2017**).

The results showed that there was highly statistically significant difference detected between continuous and interrupted groups as regard time needed for wound suturing that interrupted group had more time needed for wound suturing compared to continuous group (mean \pm standard deviation: 13.1 \pm 2.98 versus 18.11 \pm 3.98).

The results agreed with previous studies including **Valenzuela et al.**, who reported that continuous group needed less repair time while **Kettle et al.**; **Morano et al.**, did not include time needed for wound suturing as a parameter for the comparison between continuous and interrupted suturing

techniques(**Valenzuela et al., 2009; Kettle, Dowswell and Ismail, 2012**).

The results showed that there was no statistically significant difference detected between continuous and interrupted groups as regard wound infection (Negative 91.3% versus 89% - Positive 8.7% versus 11%).

The results agreed with previous studies including **Kettle et al.**; **Morano et al.**, who reported that there was no statistically significant difference detected between continuous and interrupted groups as regard wound infection while **Valenzuela et al.**, did not include wound infection as a parameter for the comparison between (**Valenzuela et al., 2009; Kettle, Dowswell and Ismail, 2012**).

The results showed that there was a significant increase in the number of patients need analgesia in the first 48 hours in interrupted technique than the continuous (38.9 of the patient need analgesia in interrupted, while only 20% need analgesia in continuous).

Our findings agree with those of **Kettle et al.**; **Morano et al.**, who reported that there was an overall reduction in analgesia use in association with the continuous techniques for perineal closure versus interrupted stitches(**Kettle, Dowswell and Ismail, 2012**).

The results showed that there was a significant increase in the number of patients had a perineal pain after 48 hr and after ten days in interrupted technique than the continuous (83% versus 51% after 48 hours - 58% versus 30% after ten days).

Our results were in agreement with those of **Kettle et al.**, in their randomized study concluded that the continuous subcuticular technique of perineal repair was associated with less pain in the immediate postpartum period when compared with the interrupted suture technique(**Kettle, Dowswell and Ismail, 2012**).

The difference in pain between the suturing methods is believed to be due to increasing suture tension caused by oedema. With continuous repair, tension is transferred through the whole length of the single suture. Another important factor which could contribute to this reduction of pain, is that skin sutures are inserted into the subcutaneous tissue, thus avoiding nerve endings in the skin surface. For this reason, **Gordon et al.** suggested leaving the skin unsutured even in second stage postpartum perineal repair(**Frohlich and Kettle, 2015**).

Our results agree with those of **Valenzuela et al.**, who published their research on four hundred, forty-five women who had undergone vaginal deliveries 1lh episiotomies, one group was repaired with continuous non-locking sutures and the other group interrupted transcutaneous sutures. The threads used for stitching

were identical in both groups. When comparing the group with a continuous suture to the group with interrupted sutures, the differences included less repair time and fewer suture materials used. There were statistically significant higher operative time and higher suture materials used in the interrupted groups than continuous knotless groups (**Valenzuela et al., 2009**).

The results showed that there was a significant increase in the number of towels used in a continuous group than in the interrupted group so there is no a significant difference in the amount of blood loss during repair of both groups.

The previous researches including **Kettle et al., Morano et al., Kettle et al., 2007; Valenzuela et al.**, did not include measuring of amount of the blood loss by number of soaked towels as a parameter for the comparison between continuous and interrupted sutures techniques (**Valenzuela et al., 2009; Kettle, Dowswell and Ismail, 2012**).

The results showed that there were lower VAS scores in continuous groups than interrupted groups at 12 hours, 48 hours and after 10 days (mean \pm standard deviation: 3.21 ± 1.65 versus 5.65 ± 2.06 after 12 hours - 3.05 ± 1.71 versus 5.22 ± 2.11 after 48 hours - 1.81 ± 1.06 versus 2.98 ± 1.89 after ten days) So there is a highly significant difference after 12 hours and after 48 hr, but there is no significant difference after ten days.

Our results were in agreement with those of **Kettle et al., Morano et al., Kettle et al., 2007; Valenzuela et al.**, who reported that there were lower VAS scores in continuous groups than interrupted groups at 12 hours, 48 hours and after ten days (**Valenzuela et al., 2009; Kettle, Dowswell and Ismail, 2012**).

Our findings agree with those of **Kindberg et al., Sandra et al.**, who reported that there was highly statistically significant difference detected between continuous and interrupted groups as regard time of dyspareunia after 2 months that interrupted group had more time of dyspareunia compared to continuous group (**Valenzuela et al., 2009; Kettle, Dowswell and Ismail, 2012**).

The results showed that there was highly statistically significant difference detected between continuous and interrupted groups as regard time of dyspareunia after 4 months that interrupted group had more time of dyspareunia compared to continuous group (Negative 98% vs 78.6% - Positive 2% vs 21.4%).

Our results were not in agreement with those of **Kindberg et al., Sandra et al.**, who reported that there was no statistically significant difference detected between continuous and interrupted groups as regard time of dyspareunia after 4 months that interrupted group had more time of dyspareunia

compared to continuous group (**Valenzuela et al., 2009; Kettle, Dowswell and Ismail, 2012**).

Conclusion

The use of a continuous knotless technique for perineal repair is associated with less time of wound suturing, time of wound healing, length of threads used by centimetres perineal pain at 12 hours, 48 hours and ten days, need for analgesia and lower VAS scores than techniques with interrupted sutures. Indeed, the introduction of a continuous suturing policy would provide more comfortability; less suturing materials, less time for repair and less analgesia are needed than for the interrupted method of repair.

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