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LOCKED V/S UNLOCKED LAYER CLOSURE OF CAESARIAN INCISION IN PREVENTION OF GYNECOLOGICAL SYMPTOMS

Dr. Padmini Baghel[1], Dr. Gajendra Singh Tomar[2], Dr. Archana Sahu[3]

[1]Third year PG resident, Department of Obstetrics and Gynaecology, Index Medical College Hospital & Research Centre, Indore, Madhya Pradesh, India

[2]Professor, Department of Obstetrics and Gynaecology, Index Medical College Hospital & Research Centre, Indore, Madhya Pradesh, India

[3]Third year PG resident, Department of Obstetrics and Gynaecology, Index Medical College Hospital & Research Centre, Indore, Madhya Pradesh, India

Corresponding Author:
Dr. Archana Sahu
Email: archana.nscbmc@gmail.com

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ABSTRACT

Introduction: Cesarean section is one of the most commonly performed surgical procedures, both in our country and globally. Over time, the technique for cesarean section has evolved significantly, undergoing numerous changes and refinements since its inception. Among these changes, uterine repair remains one of the most debated and controversial aspects.The objective of this study was to compare the efficacy of locked and unlocked uterine closure techniques in terms of bleeding control and uterine incision healing among patients undergoing cesarean section.

Methods: This prospective controlled study included patients undergoing cesarean section. Safety was the primary focus of evaluation. Hemoglobin count (HC) and serum creatine kinase (CK) levels were measured before and 24 hours after the operation in the locked group (n = 56) and the unlocked group (n = 56). Hemoglobin deficit, CK elevation, and the need for additional hemostatic sutures were compared between the two groups. Additionally, uterine scar healing was assessed three months post-operation. Scar thickness, presence of niche, and the percentage of thinning of the scar region were calculated and compared between the two groups.

Results: The study found that hemoglobin deficit was similar in both groups. Although CK elevation was less in the unlocked group, this difference was not statistically significant. The unlocked group required more additional sutures for hemostasis. Furthermore, the thickness of

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the niche and the percentage of thinning in the scar region were significantly lower in the unlocked group.
Conclusions: The unlocked uterine closure technique demonstrated safety and resulted in less damage to the myometrium compared to the locked technique.

Key Words: Cesarean section, niche, suture techniques, surgical techniques, ultrasonography.

INTRODUCTION

Cesarean section (CS) ranks among the most common surgical procedures globally, including in our country. Complications related to CS, such as placenta abnormalities and uterine scar issues, can impact subsequent pregnancies. Over time, CS techniques have evolved, with uterine repair being a contentious topic. A Cochrane review compared double-layer closure with single-layer closure, noting less blood loss with single-layer closure but insufficient data to determine the superior surgical technique [1].

In a multicenter case-control study, patients attempting labor after CS were assessed for uterine rupture and closure method. Single-layer closure was associated with a doubled risk of uterine rupture, contrasting with a meta-analysis that found locked single-layer closures posed a higher rupture risk than double-layer closures. This aligns with Jelsema's hypothesis linking locked suture techniques to tissue ischemia and necrosis [2-4]. However, the locked single-layer closure of the lower uterine segment incision has gained favor among surgeons for its hemostatic benefits.

Transvaginal ultrasound imaging reliably identifies CS scars, with scar thickness linked to rupture risk during labor trials [5-10]. Yet, limited studies have examined the relationship between scar appearance and suture technique. Hence, our study aims to compare locked and unlocked single-layer uterine closures concerning perioperative safety (hemostasis) and postoperative scar quality.

MATERIAL AND METHODS

The prospective controlled study was conducted in Index Medical College Hospital & Research Centre. Patients scheduled for cesarean section were provided detailed information about the procedures involved and were included in the study after providing informed consent. The study was conducted in two stages: assessing perioperative safety primarily and evaluating postoperative uterine healing secondarily.

The study included women with medical indications for cesarean section. Exclusion criteria comprised prior uterine surgeries (e.g., loop electrosurgical excision procedure, conization, curettage, myomectomy), bleeding disorders, high arterial blood pressure, and irregular separation of the myometrium during surgery.

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Stage 1: Blood tests were conducted before and 24 hours after cesarean section to measure hemoglobin levels and serum creatine kinase (CK) levels. Elevated serum creatine kinase (CK) levels can indicate potential damage to myometrial tissue [11,12]. Hemoglobin deficits, CK increases, and the need for additional hemostatic sutures were recorded. SPSS 20 was used for statistical analysis, including chi-square tests for categorical variables and parametric t-tests for variables showing normal distribution.

Stage 2: Patients were evaluated three months post-operation, excluding those with repeat cesarean sections. Ultrasound examinations were performed to assess scar thickness, myometrial thickness, and scar healing characteristics. Modified Osser's Technique [6] was applied to calculate scar thickness, myometrial thickness, niche thickness, and the percentage of scar thinning. Statistical analysis involved chi-square tests and parametric t-tests for appropriate variables. The study compared locked and unlocked uterine closure techniques in cesarean sections, evaluating safety, bleeding control, and uterine incision healing.

RESULTS

During the initial phase, there were no significant differences between the two groups in terms of age, BMI, gravidity, parity, primary cesarean rate, or hemoglobin deficit. Although there was a trend of less CK elevation in the unlocked group compared to the locked group, this disparity did not reach statistical significance. However, the unlocked group exhibited a significantly higher proportion of patients requiring additional sutures (17.86% vs. 1.79%, $p < 0.05$) (refer to Table 1).

In the subsequent phase, both the locked and unlocked groups showed comparable characteristics in terms of age, BMI, gravidity, parity, and retroverted uterus (as shown in Table 2). While the scar thickness tended to be greater in the unlocked group, this difference did not achieve statistical significance ($p = 0.06$). Nevertheless, the unlocked group demonstrated significantly lower niche thickness and thinning percentage compared to the locked group (refer to Table 3 and Figure 1).

Table 1: Baseline data and perioperative outcomes (Stage 1)

Variable	Locked (n = 56)	Unlocked (n = 56)
Age (years)	27.5 ± 4.8	31.5 ± 5.3
BMI (kg/m²)	29.5 ± 4.2	31.0 ± 4.6
Primary CS	30 (53.57)	24 (42.86)
Additional hemostatic suture used	1 (1.79)	10 (17.86)
Duration of operation (minutes)	21.0 ± 2.5	20.0 ± 1.8
Hemoglobin deficit (gm/dl)	1.10 ± 0.75	1.08 ± 0.70
CK increase (U/L)	306.1 ± 258.6	201.7 ± 252

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Table 2: Baseline data (Stage 2)

Parameter	Locked (n = 56)	Unlocked (n = 56)
Age (years)	26.3 ± 5.1	28.9 ± 4.9
BMI (kg/m²)	30.7 ± 3.4	29.7 ± 6.6
Retroverted uterus; n (%)	10 (17.85)	16 (28.57)

Table 3: Comparison of Postoperative USG Findings (stage 2)

Parameter	Locked (n = 56)	Unlocked (n = 56)	P value
Scar thickness (mm)	7.9 ± 2.9	8.3 ± 2.1	0.06
Fundal region thickness (mm)	12.2 ± 3.5	13.4 ± 2.7	0.85
Isthmic region thickness (mm)	10.9 ± 3.5	11.2 ± 2.4	0.39
Niche thickness (mm)	5.0 ± 2.3	2.6 ± 1.6	<0.05
Thinning percentage (%)	36.6 ± 16.4	25.7 ± 12.1	<0.05

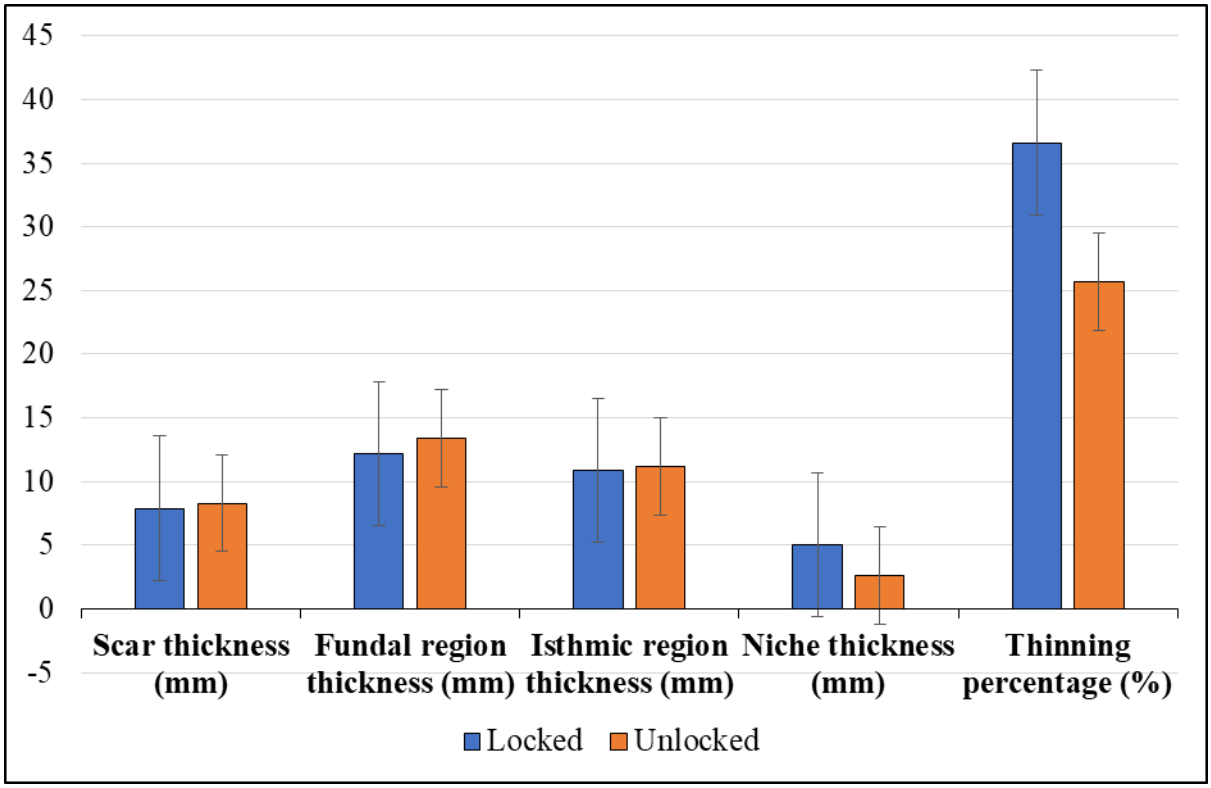

Figure 1: Visual comparison of Postoperative USG findings in two groups

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DISCUSSION

The increasing incidence of cesarean sections has raised concerns regarding potential adverse outcomes in subsequent pregnancies. One of the main concerns is the risk of uterine rupture, with reported incidences ranging from 0.5% to 4% [13]. Variations in uterine closure techniques can influence scar tissue durability and the potential for complications such as myometrial tissue necrosis. The locked technique, commonly used for its hemostatic control, may contribute to tissue necrosis due to the tightening movement during locking.

Studies by Rodrigues et al. [14] and Gul et al. [15] have examined the effects of suturing techniques on tissue integrity, highlighting the importance of gentle tissue manipulation to minimize damage. While some studies have compared unlocked and locked sutures in terms of bleeding control, security, and tissue damage, there remains a lack of comprehensive research comparing scar thickness and its correlation with uterine rupture [16].

Our study aimed to enhance the safety of the unlocked method while evaluating scar healing. We observed comparable hemostasis but noted a higher requirement for additional suturing with the unlocked technique (17% vs. 2%). Elevated creatine kinase (CK) levels, indicative of muscle tissue damage, have been associated with cesarean sections and vaginal births [17,18]. Our investigation into CK levels revealed a noticeable increase with the locked method, although not statistically significant, suggesting potential tissue damage beyond the uterus during cesarean sections.

Transvaginal ultrasound is commonly used to assess cesarean section scars, with findings indicating myometrial thinning and scar dehiscence [6-8]. Alternative methods such as magnetic resonance imaging (MRI) and sonohysterography have also been explored for scar evaluation [19,20]. In our study, transvaginal ultrasound at three months post-operation revealed reduced myometrial thinning with the unlocked method, indicating less myometrial damage compared to the locked method.

Despite these findings, our study had limitations including the lack of a power analysis, randomization, and blinding. These factors should be considered in future research to further elucidate the optimal uterine closure technique to minimize complications in cesarean deliveries.

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CONCLUSION

Scar formation following cesarean section is inevitable. However, we can explore suture techniques to minimize its impact. In clinical practice, it's crucial to handle tissues with kindness and respect to minimize tissue reactions, as any form of manipulation or dissection can induce such reactions.

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