

MATERNAL OUTCOMES FOLLOWING CONSERVATIVE AND SURGICAL MANAGEMENT OF CESAREAN SCAR PREGNANCY: A RETROSPECTIVE

Shagufta Jabeen^{1*}, Ariz-e-Gul Chaudhary², Bazla Younas³, Amir Asad Shah⁴, Abeera Ashfaq⁵

¹*FCPS, Senior Woman Medical Officer (SWMO), Gynaecology and Obstetrics, Nishtar Hospital, Multan, Pakistan

²Consultant Gynaecologist, Department of Gynaecology and Obstetrics, Mujahid Hospital, Faisalabad, Pakistan

³Consultant, Department of Gynaecology and Obstetrics, EVA Hospital, Lahore, Pakistan

⁴Additional Principal Medical Officer, Department of Pathology, Nishtar Medical University, Multan, Pakistan

⁵Senior Woman Medical Officer (SWMO) Gynaecology, Nishtar Hospital, Multan, Pakistan

*Corresponding Author: Shagufta Jabeen, Email: shaguftajaben85@yahoo.com

ABSTRACT

Objective: To compare the effectiveness of various treatment modalities in a cesarean scar pregnancy, in terms of the success rate of treatment and maternal parameters among women treated at a tertiary care hospital.

Methodology: The present Retrospective Analytical Comparative Study was carried out in Nishtar Hospital Multan after getting approval from the Institutional Review Board / Ethics Committee. The medical records of women with the diagnosis of cesarean scar pregnancy (CSP) from 3 to 6 months were examined. Treatment was based on the clinical judgment and institutional procedures of the attending consultant, including medical management with methotrexate, ultrasound-guided suction evacuation, hysteroscopic resection, laparoscopic resection or open surgical management as clinically indicated. The main outcome was treatment success, which was the complete resolution of CSP without requiring further treatment and the preservation of the uterus.

Results: Among 100 women with cesarean scar pregnancy, treatment success was significantly higher with surgical management than conservative management (98% vs. 80%, $p=0.003$), with fewer repeat interventions (2% vs. 18%, $p=0.007$). Surgical management was also associated with lower blood loss (115 ± 42 vs. 180 ± 70 mL), shorter hospital stay (2.1 ± 0.7 vs. 3.8 ± 1.4 days), fewer blood transfusions (4% vs. 16%), and faster β -hCG normalization (28 ± 8 vs. 42 ± 13 days). Overall complications were significantly lower in the surgical group (8% vs. 22%, $p=0.046$). Multivariable analysis identified surgical management as an independent predictor of treatment success (adjusted OR 5.84, 95% CI 1.31–26.10, $p=0.021$).

Conclusion: The surgical treatment of cesarean scar pregnancy was more successful, had less maternal morbidity, less blood loss, shorter hospital stays and fewer surgical procedures in comparison with conservative pregnancy treatment. A timely diagnosis, with transvaginal ultrasonography, and the choice of treatment is key to maximize maternal health with the maintenance of uterine integrity and future fertility.

KEYWORDS: Cesarean section, Pregnancy, Surgery

INTRODUCTION

Cesarean scar pregnancy (CSP) is a rare but growing type of ectopic pregnancy where the embryo implants in a defect of a previous cesarean section scar in the myometrium. There has been an increasing trend in the diagnosis of CSP over the years, leading to its emergence as an important and increasingly common challenge in today's obstetric practice, given the rise in cesarean delivery rates across the globe and the progress in first-trimester ultrasonography (Noël & Thilaganathan, 2022; SMFM, 2022; Smith & Morgan, 2024).

The surgical connotations of cesarean scar pregnancy are significant and can cause significant maternal morbidity when there is continuing trophoblastic invasion, which may lead to major bleeding, uterine rupture, placenta accreta spectrum disorders, emergency hysterectomy, and even compromise the future fertility of the mother (Noël & Thilaganathan, 2022; Huang et al., 2023; SMFM, 2022). The use of transvaginal ultrasonography has revolutionized the diagnostic process and has resulted in better outcomes in clinical practice if used at an early stage to detect and act on the disease before it can reach a catastrophic stage. However, the diagnosis and management of the condition is difficult, as it can vary, is rare and has no defined management pathways.

Different treatment options for CSP have been proposed such as systemic or local methotrexate treatment, ultrasound-assisted suction evacuation, hysteroscopic resection, laparoscopy and laparotomy, uterine artery embolization and combination of these methods. The best treatment option depends on gestational age, serum β -human chorionic gonadotropin (β -hCG) level, fetal cardiac activity, residual myometrial thickness, and hemodynamic stability, the patient's desire for children, and the availability of institutional expertise. As a result, there is no standard approach to the management of the condition and significant practice differences (Alameddine et al., 2024; Smith & Morgan, 2024; SMFM, 2022).

Systematic reviews and meta-analyses recently have shown that medically managed surgery may not be as successful as minimally invasive surgery, and present a lower risk of complications. The evidence that is available, however, comes mainly from retrospective observational studies, which have small numbers of patients, and diverse definitions of outcomes with widely varying treatment protocols. These restrictions limit the generalizability of existing evidence and continue to encourage uncertainty about the most beneficial and safe therapeutic management for women with CSP (Alameddine et al., 2024; Silva et al., 2023).

This is especially true for LMICs, such as Pakistan, where the cesarean section rate has risen significantly and there is a lack of published comparative data on the management of cesareans. Treatment outcomes could vary due to disparities in healthcare infrastructure, surgical skill, patient demographics, and access to resources, making it important to have context-specific evidence to inform clinical decisions. Comparative assessment of maternal outcomes after various treatment modalities is therefore crucial to determine the optimal treatment modality in order to maximize treatment success with minimal maternal morbidity.

The aim of the present study is to compare the effectiveness of various treatment modalities in a cesarean scar pregnancy, in terms of the success rate of treatment and maternal parameters among women treated at a tertiary care hospital. The results will help to build on the body of existing evidence and inform the development of evidence-informed management strategies for this growing condition in obstetrics.

METHODOLOGY

The present Retrospective Analytical Comparative Study was carried out in Nishtar Hospital Multan after getting approval from the Institutional Review Board / Ethics Committee. The medical records of women with the diagnosis of cesarean scar pregnancy (CSP) from 3 to 6 months were examined. All patients with the inclusion criteria over the study period were included as eligible patients. Transvaginal ultrasonography with the acceptance of the diagnostic criteria was used to diagnose the CSP. Those who had a confirmed diagnosis of CSP who received medical or surgical treatment at the study center were included, while patients with an incomplete medical record, other type of ectopic pregnancy (OEP), gestational trophoblastic disease or those treated elsewhere before referral were excluded. The demographic, clinical, laboratory, ultrasonographic, treatment and outcome data were obtained from the hospital records on a standard data collection form.

Treatment was based on the clinical judgment and institutional procedures of the attending consultant, including medical management with methotrexate, ultrasound-guided suction evacuation, hysteroscopic resection, laparoscopic resection or open surgical management as clinically indicated. The main outcome was treatment success, which was the complete resolution of CSP without requiring further treatment and the preservation of the uterus. Secondary outcomes consisted of blood loss, blood transfusion, length of hospital stay, complications, requirement for further intervention, hysterectomy, and time to β -hCG normalization. An IBM SPSS Statistics version 27 was used to analyze the data. Means and standard deviations were used to summarize continuous variables and frequencies and percentages were used to summarize categorical variables. One-way ANOVA or Kruskal–Wallis test was used for continuous variables and Chi-square or Fisher's exact test was used for categorical variables for comparison between the treatment groups. Independent predictors of treatment success were determined by multivariable logistic regression. The results were considered statistically significant if the p-value was <0.05 .

RESULTS

Table1.BaselineDemographicandClinical Characteristics

Variable	Conservative Management(n=50)	Surgical Management (n=50)	P-value
Age(years),Mean± SD	31.7 ± 4.6	32.1 ± 5.2	0.68
BMI(kg/m ²), Mean ± SD	27.2 ± 3.4	26.9 ± 3.8	0.71
Gravidity, Mean±SD	3.1 ± 1.1	3.3 ± 1.2	0.44
Previous Cesarean Sections	2.1 ± 0.8	2.0 ± 0.7	0.59
Gestational Age (weeks)	7.2 ± 1.0	7.4 ± 0.9	0.28
β -hCG (IU/L), Median (IQR)	17,200(12,500–23,600)	18,900(13,200–24,700)	0.31
Fetal Cardiac Activity, n(%)	18 (36%)	20 (40%)	0.68

Table2.DistributionofTreatmentModalities

Treatment	Number	Percentage
Methotrexate	50	50%
Surgical Management	50	50%
Total	100	100%

Table3.PrimaryTreatmentOutcome

Outcome	Conservative	Surgical	P-value
Successful Treatment	40 (80%)	49 (98%)	0.003
Failed Treatment	10 (20%)	1 (2%)	
Repeat Intervention	9 (18%)	1 (2%)	0.007
Uterus Preserved	48 (96%)	50 (100%)	0.15

Table4.Maternal Outcomes

Outcome	Conservative	Surgical	P-value
Blood Loss (mL), Mean±SD	180 ± 70	115 ± 42	<0.001
Blood Transfusion	8 (16%)	2 (4%)	0.04
Hospital Stay (days)	3.8 ± 1.4	2.1 ± 0.7	<0.001
ICU Admission	3 (6%)	0	0.08
Hysterectomy	2 (4%)	0	0.15
Time to β-h CG Normalization(days)	42 ± 13	28 ± 8	<0.001

Table5.Maternal Complications

Complication	Conservative	Surgical	P-value
Hemorrhage	7 (14%)	2 (4%)	
Infection	3 (6%)	1 (2%)	
Uterine Rupture	1 (2%)	0	
Bladder Injury	0	1 (2%)	
Overall Complications	11 (22%)	4 (8%)	0.046

Table 6. Predictors of Treatment Success (Multivariable Logistic Regression)

Variable	Adjusted OR	95% CI	P-value
Age	0.97	0.88–1.08	0.62
Gestational Age	0.89	0.67–1.18	0.42
β-hCG	0.99	0.98–1.00	0.07
Fetal Cardiac Activity	0.71	0.28–1.84	0.49
Surgical Management	5.84	1.31–26.10	0.021

Table7.SummaryofOverallOutcomes

Outcome	Conservative	Surgical
Treatment Success	80%	98%
Blood Loss	Higher	Lower
Blood Transfusion	More Frequent	Less Frequent
Hospital Stay	Longer	Shorter
Repeat Intervention	More Frequent	Rare
Overall Complications	Higher	Lower
Maternal Outcome	Good	Excellent

DISCUSSION

The results of the present study show that surgical treatment of cesarean scar pregnancy (CSP) had significantly better success rates, less blood loss, reduced hospital stay, less reintervention and less maternal complication rates than conservative treatment. These results would indicate that if carefully chosen, surgery results in better clinical outcomes, with good uterine preservation rates. Early diagnosis, using transvaginal ultrasonography, and the individualized treatment plan are still the most important aspects of optimizing maternal outcomes and reducing serious complications of CSP (Society for Maternal-Fetal Medicine [SMFM], 2022; Noël & Thilaganathan, 2022; Huang et al., 2023).

The superior degree of treatment efficacy in the surgical group is in line with that of the parent study by Verberkt et al. (2023), which reported that women treated with ultrasound-guided curettage and laparoscopic niche resection had excellent treatment outcomes, while those receiving systemic methotrexate had more

frequent additional treatment before treatment success. This is also in line with recent systematic reviews that demonstrated higher primary treatment success and quicker recovery with minimally invasive surgical techniques in appropriate patients compared to medical management (Alameddine et al., 2024; Hameed et al., 2023; Diakosavvas et al., 2022). Better results seen where surgery was performed may be due to the removal of trophoblastic tissue at the time of surgery which would lead to early resolution of the ectopic pregnancy and minimize the risk of chronic disease.

Our results also revealed better maternal outcome in patients undergoing surgery, which included decreased blood loss, hospital stay and postoperative complications. The observations are similar to those of Silva et al. (2023) who noted that conservative management is often associated with long-term follow-up with serial serum β -hCG levels and repeat ultrasonographic evaluations, as there is delayed resolution of the trophoblastic tissue. Similarly, according to the SMFM guideline, no one management is suitable for all patients and each case should be treated individually depending on the gestational age, remaining myometrial thickness, fetal heart activity and desire for future pregnancies (SMFM, 2022). Together these results suggest that surgical management of CSP in carefully selected women may be beneficial and that a multidisciplinary approach to decision-making and prompt referral to specialized centers should be encouraged.

The present study's results are in accordance with the expanding international body of evidence in support of individualized management of cesarean scar pregnancy. There is increasing emphasis on the importance of careful patient selection, timely diagnosis, gestational age, myometrial residual thickness, serum β -hCG levels, and fetal cardiac activity as factors contributing to successful management (Jordans et al., 2022; Alameddine et al., 2024; Hameed et al., 2023). The advancement of transvaginal ultrasonography and minimally invasive surgical procedures have significantly enhanced the success of early diagnosis and treatment and minimized maternal morbidity. Such progress has allowed physicians to maintain the integrity and reproductive potential of the uterus in the majority of women who have been diagnosed with CSP.

The clinical implications of these findings are relevant in countries where caesarean section rate still rose. Standardized ultrasonographic assessment and prompt referral to a tertiary care center for the early diagnosis of CSP could substantially decrease the incidence of serious maternal complications such as massive hemorrhage, uterine rupture, and emergency hysterectomy. Thus, decisions regarding treatment should be made on a case-by-case basis, taking into account the individual clinical situation, reproductive goals, and available expertise and resources, in line with current international guidelines (SMFM, 2022; Noël & Thilaganathan, 2022).

There are a number of strengths in the present study. It directly contrasted two types of management—conservative versus surgical—with common and standardized maternal outcome measures and is reflective of the real world. It will be important to remember, however, that there are some restrictions to keep in mind. Retrospective design may have led to selection and information bias, and the findings may not be generalizable to other centers due to the relatively small number of participants studied. Moreover, long-term reproductive outcomes and subsequent pregnancy outcomes were not evaluated. To develop standard treatment regimens and assess the long-term maternal and reproductive consequences of various management options for cesarean scar pregnancy, future prospective multicenter studies with larger cohorts and extended follow-up are needed.

The results from this study are consistent with the emerging data that individualized surgical management, if it is done in a more select population, is associated with better short-term maternal outcomes than conservative management. Selection of patients, early diagnosis and multidisciplinary management are the foundation of successful therapy and will lead to a reduction of maternal morbidity, while maintaining future fertility.

CONCLUSION

Finally, this study's results indicated that surgical treatment of cesarean scar pregnancy was more successful, had less maternal morbidity, less blood loss, shorter hospital stay and fewer surgical procedures in comparison with conservative pregnancy treatment. A timely diagnosis, with transvaginal ultrasonography, and the choice of treatment is key to maximize maternal health with the maintenance of uterine integrity and future fertility. Surgical interventions have been shown to have more predictable clinical outcomes in appropriate clinical settings, although conservative management is a valuable option when it is appropriate. Larger, multicenter, prospective studies with extended follow-up are recommended to confirm the results and provide standardized management protocols for cesarean scar pregnancy based on evidence.

REFERENCE

1. Society for Maternal-Fetal Medicine (SMFM), Miller, R., Gyamfi-Bannerman, C., & Publications Committee. (2022). Society for Maternal-Fetal Medicine Consult Series #63: Cesarean scar ectopic pregnancy. *American Journal of Obstetrics and Gynecology*, 227(3), B9–B20. <https://doi.org/10.1016/j.ajog.2022.06.024>
2. Hameed, M. S. S., Wright, A., & Chern, B. S. M. (2023). Cesarean scar pregnancy: Current understanding and treatment including role of minimally invasive surgical techniques. *Gynecology and Minimally Invasive Therapy*, 12(2), 64–71. https://doi.org/10.4103/gmit.gmit_116_22
3. Silva, B., Viana Pinto, P., & Costa, M. A. (2023). Cesarean scar pregnancy: A systematic review on

- expectant management. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 288, 36–43. <https://doi.org/10.1016/j.ejogrb.2023.06.030>
4. Huang, J., Phillips, C., & Moshiri, M. (2023). Scarred for life: A review of cesarean section scar pregnancy and potential pitfalls in diagnosis. *Abdominal Radiology*, 48(8), 2672–2683. <https://doi.org/10.1007/s00261-023-03953-7>
 5. Jordans, I. P. M., Verberkt, C., de Leeuw, R. A., et al. (2022). Definition and sonographic reporting system for cesarean scar pregnancy in early gestation: Modified Delphi method. *Ultrasound in Obstetrics & Gynecology*, 59(4), 437–449.
 6. Noël, L., & Thilaganathan, B. (2022). Caesarean scar pregnancy: Diagnosis, natural history and treatment. *Current Opinion in Obstetrics and Gynecology*, 34(5), 302–308. <https://doi.org/10.1097/GCO.0000000000000808>
 7. Betrán, A.P., Ye, J., Moller, A.B., Souza, J.P., & Zhang, J. (2021). Trends and projections of caesarean section rates: Global and regional estimates. *BMJ Global Health*, 6, e005671.
 8. Verberkt, C., de Leeuw, R. A., et al. (2023). Effectiveness, complications, and reproductive outcomes after cesarean scar pregnancy management: A retrospective cohort study. *American Journal of Obstetrics and Gynecology Global Reports*.
 9. Vieira de Mello, P., Bruns, R. F., Klas, C. F., & Hammes, L. R. (2023). Expectant management of viable cesarean scar pregnancies: A systematic review. *Archives of Gynecology and Obstetrics*, 308(3), 701–707. <https://doi.org/10.1007/s00404-022-06835-3>
 10. Alameddine, S., Lucidi, A., Jurkovic, D., Timor-Tritsch, I., Coutinho, C. M., Ranucci, L., Buca, D., Khalil, A., Jauniaux, E., Mappa, I., & D'Antonio, F. (2024). Treatments for cesarean scar pregnancy: A systematic review and meta-analysis. *Journal of Maternal-Fetal & Neonatal Medicine*.
 11. Knapman, B. L., Forgues, M. A., Abbott, J. A., & Maheux-Lacroix, S. (2023). Other treatments for cesarean scar pregnancy. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 90, 102367. <https://doi.org/10.1016/j.bpobgyn.2023.102367>
 12. Diakosavvas, M., Kathopoulis, N., Angelou, K., Chatzipapas, I., Zacharakis, D., Kypriotis, K., Grigoriadis, T., & Protopapas, A. (2022). Hysteroscopic treatment of cesarean scar pregnancy: A systematic review. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 270, 42–49. <https://doi.org/10.1016/j.ejogrb.2021.12.038>
 13. Jordans, I. P. M., Verberkt, C., de Leeuw, R. A., et al. (2022). Modified Delphi consensus on the sonographic reporting of cesarean scar pregnancy. *Ultrasound in Obstetrics & Gynecology*, 59(4), 437–449.
 14. Alameddine, S., Lucidi, A., Jurkovic, D., Timor-Tritsch, I., Coutinho, C. M., Ranucci, L., Buca, D., Khalil, A., Jauniaux, E., Mappa, I., & D'Antonio, F. (2024). Treatments for cesarean scar pregnancy: A systematic review and meta-analysis. *The Journal of Maternal-Fetal & Neonatal Medicine*, 37(1), Article 2327569. <https://doi.org/10.1080/14767058.2024.2327569>
 15. Wang, C. J., Chao, A. S., Yen, C. F., et al. (2022). Contemporary management of cesarean scar pregnancy: Current evidence and future perspectives. *Taiwanese Journal of Obstetrics and Gynecology*, 61(5), 741–748.
 16. Timor-Tritsch, I. E., Monteagudo, A., & colleagues. (2022). Ultrasound diagnosis and management principles of cesarean scar pregnancy: Current concepts. *Ultrasound in Obstetrics & Gynecology*, 60(3), 291–300.
 17. Silva, B., Viana Pinto, P., & Costa, M. A. (2023). Cesarean scar pregnancy: A systematic review on expectant management. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 288, 36–43. <https://doi.org/10.1016/j.ejogrb.2023.06.030>
 18. Verberkt, C., de Leeuw, R. A., Jordans, I. P. M., et al. (2023). Effectiveness, complications, and reproductive outcomes after cesarean scar pregnancy management: A retrospective cohort study. *American Journal of Obstetrics and Gynecology Global Reports*.
 19. Hameed, M. S. S., Wright, A., & Chern, B. S. M. (2023). Cesarean scar pregnancy: Current understanding and treatment, including the role of minimally invasive surgery. *Gynecology and Minimally Invasive Therapy*, 12(2), 64–71.
 20. Society for Maternal-Fetal Medicine (SMFM). (2022). SMFM Consult Series #63: Cesarean scar ectopic pregnancy. *American Journal of Obstetrics and Gynecology*, 227(3), B9–B20. <https://doi.org/10.1016/j.ajog.2022.06.024>