MORPHOLOGICAL AND CLINICAL EFFECTS OF BLOOD STOP HEMOSTATIC AGENT ON UTERINE WOUND HEALING IN OBSTETRIC HEMORRHAGE

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Annotation

Postpartum hemorrhage remains one of the leading causes of maternal morbidity and mortality worldwide, and the morphological mechanisms underlying the tissue-level action of local hemostatic agents remain insufficiently studied. This study presents a combined experimental-clinical evaluation of the local hemostatic agent Blood Stop, focusing on its influence on myometrial regeneration, microcirculatory recovery, and scar formation after uterine wound closure, alongside its clinical hemostatic efficacy in obstetric practice. The findings demonstrate that Blood Stop promotes more complete morphological and functional healing of the uterine scar compared with conventional local hemostatic agents, while providing favorable clinical outcomes in terms of hemostasis time, blood loss volume, and recurrence rate.

Keywords: obstetric hemorrhage, Blood Stop, local hemostasis, myometrial regeneration, uterine scar, microcirculation, cesarean section.

Introduction

Despite the implementation of modern prevention and treatment protocols, obstetric hemorrhage continues to occupy a leading position among the direct causes of maternal mortality, particularly in settings with limited healthcare resources. Current clinical practice in obstetrics has largely focused on the functional efficacy of hemostatic agents, while the morphological mechanisms of their action at the tissue and cellular level remain poorly characterized. In particular, the influence of local hemostatics on myometrial regeneration, postoperative scar formation, the state of the microcirculatory bed, and the severity of inflammatory-destructive changes in uterine tissue after hemorrhage has received limited attention. Blood Stop, a promising local hemostatic agent widely used in surgical and obstetric practice, has been evaluated mainly through clinical observation and blood-loss reduction indices, without systematic morphological verification of its efficacy and safety. The absence of data correlating clinical outcomes with morphological tissue changes limits an objective assessment of the pathogenetic rationale for its use in obstetrics. This determined the relevance of a comprehensive study of the morphological and clinical effects of Blood Stop in obstetric hemorrhage.

Materials and Methods

The study was designed as a combined experimental-clinical investigation. The experimental component included 60 rabbits, in which uterine wounds were modeled

and treated with Blood Stop, compared against a control group and a group treated with conventional local hemostatic gels. Myometrial tissue samples were examined using histological and morphometric methods to assess the degree of inflammatory infiltration, muscle layer architecture, fibrous remodeling, and microvascular density at sequential healing stages. The clinical component included 90 women who underwent cesarean section, in whom the efficacy of Blood Stop was evaluated using ultrasound and Doppler measurements of myometrial thickness, scar condition index, and uterine radial artery blood flow, together with clinical parameters including time to hemostasis, volume of blood loss, and frequency of recurrent bleeding. Statistical analysis was performed to compare outcomes between the Blood Stop group and the group treated with traditional hemostatic methods.

Results and Discussion

Morphological analysis demonstrated that application of Blood Stop was associated with more complete formation of the myometrial scar, characterized by preservation of muscle layer architecture and limited fibrous remodeling, in contrast to the control and traditional hemostatic gel groups, which showed more pronounced inflammatory-dystrophic changes. Microvascular assessment showed that Blood Stop application preserved microcirculation within the scar area and facilitated restoration of blood flow in the uterine radial arteries on long-term follow-up, as confirmed by Doppler measurements. In contrast, conventional local hemostatic gels did not ensure complete myometrial regeneration and were associated with morphological conditions predisposing to functionally incomplete postoperative scar formation. Clinically, the Blood Stop group demonstrated a shorter time to hemostasis, reduced volume of blood loss, and a lower frequency of recurrent bleeding compared with the traditional hemostasis group. These findings indicate a consistent correlation between the morphological quality of myometrial healing and the clinical effectiveness of hemostasis, supporting the pathogenetic rationale for the use of Blood Stop in obstetric practice. Ultrasound assessment of myometrial thickness, scar condition index, and radial artery blood flow proved to be an informative, non-invasive means of monitoring reparative processes in the postoperative period.

Conclusion

The combined experimental-clinical study demonstrates that the local hemostatic agent Blood Stop promotes morphologically and functionally more complete myometrial scar formation, preserves microcirculation, and reduces inflammatory-dystrophic changes compared with conventional local hemostatic methods. These morphological advantages are paralleled by favorable clinical outcomes, including faster hemostasis, reduced blood loss, and lower recurrence of bleeding. The obtained morphological and ultrasound criteria can be recommended for the development of clinical-diagnostic algorithms evaluating uterine scar healing quality and for

individualizing patient management after cesarean section, particularly in view of subsequent pregnancy safety.

References

1. Кулаков В.И., Серов В.Н., Абубакирова А.М. и др. Пути снижения материнской смертности, обусловленной акушерскими кровотечениями // Акушерство и гинекология. — 2001. — № 1. — С. 3–4.

2. Kellie F.J., Wandabwa J.N., Mousa H.A., Weeks A.D. Mechanical and surgical interventions for treating primary postpartum haemorrhage // Cochrane Database of Systematic Reviews. — 2020. — Vol. 7, № 7. — CD013663. DOI: 10.1002/14651858.CD013663

3. WHO Recommendations for the Prevention and Treatment of Postpartum Haemorrhage. — Geneva: World Health Organization, 2012. — ISBN 978-92-4-154850-2. https://www.who.int/publications/i/item/9789241548502

4. Cullifer R.M., Makai G., Pacis M., Huynh T. Topical hemostatic and tissue-sealing agents in gynecologic surgery // Current Opinion in Obstetrics and Gynecology. — 2020. — Vol. 32, № 4. — P. 285–291. DOI: 10.1097/GCO.0000000000000632

5. Yapar Eyi E.G., Engin-Üstün Y., Kaba M., Mollamahmutoğlu L. Ankaferd blood stopper in episiotomy repair // Clinical and Experimental Obstetrics & Gynecology. — 2013. — Vol. 40, № 1. — P. 141–143. PMID: 23724529

6. Адамян Л.В., Серов В.Н., Филиппов О.С., Артымук Н.В. и др. Профилактика, лечение и алгоритм ведения при акушерских кровотечениях: клинические рекомендации (протокол). — М., 2014. — 25 с.

7. Касимова А., Негмаджанов Б.Б., Раббимова Г.Т. Сравнительная оценка эффективности методов профилактики кровотечения в последовом и раннем послеродовом периодах // Журнал проблем биологии и медицины. — 2014. — № 4.1(81).