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Efficacy of platelet-rich plasma (PRP) therapy in uterine scar healing after cesarean section

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Relevance: According to the World Health Organization, the global rate of cesarean sections (CS) has significantly increased over the past three decades, reaching 25–30%, and even 40–50% in major perinatal centers. Evaluation of post-CS reparative processes, uterine healing, and scar quality is crucial, particularly in the context of preventing uterine scar dehiscence. However, there is limited data on methods to enhance reparative activity and promote robust scar formation. In 1985, David Knighton pioneered the use of platelet-rich plasma (PRP) in treating chronic trophic ulcers. Due to its regenerative properties, PRP has emerged as a promising modality in tissue repair.

Objective: To assess the effectiveness of PRP therapy in enhancing uterine suture healing following cesarean section.

Materials and Methods: A total of 116 women who underwent cesarean section at the Republican Perinatal Center during 2023–2024 were enrolled in this study. Participants were divided into two groups: Main group (n=45): Received intraoperative platelet autoplasma (PAP) after uterine incision closure. Control group (n=71): Underwent standard surgical procedure without PAP.

Informed consent was obtained from all participants. Postoperative evaluations included ultrasound (US) examinations on days 3–4 and at 3 months post-surgery. Transvaginal US and color Doppler mapping were used to assess uterine size, vascularization, and scar quality.

Results: In the PRP group, no echographic signs of hematoma were detected, unlike in the control group, indicating PRP's hemostatic effect ($p<0.05$). Uterine involution was more pronounced in the PRP group, with significantly smaller uterine dimensions: PRP group: 117.8±1.2 mm, 107.1±1.6 mm, 70.1±1 mm. Control group: 123.8±1 mm, 112.7±2 mm, 74.8±0.5 mm ($p<0.05$)

Signs of subinvolution and lochiometra were found in only 2.2% (n=1) of patients in the PRP group versus 5.6% (n=4) in the control group. Uterine wall thickness at the suture site was similar in both groups: 26.9±0.7 mm in the PRP group and 26.7±0.8 mm in controls ($p>0.05$), indicating a generally uncomplicated recovery. At 3-month follow-up, scar thickness did not differ significantly: PRP group: 6.1±0.7 mm. Control group: 6.5±0.8 mm. In the PRP group, isolated hyperechoic inclusions (up to 1 mm) were likely unresorbed suture material. A niche defect (3 mm deep) was seen in one patient. In contrast, 2.8% of the control group showed larger hyperechoic structures (8–10 mm), possibly hematomas, and niche defects up to 8.8 mm, with remaining myometrial thickness of just 1.5–1.8 mm — suggesting scar insufficiency.

Color Doppler mapping revealed poor vascularization in only 1 patient (2.2%) in the PRP group, compared to 26 patients (36.6%) in the control group — a 16.6-fold difference. Enhanced blood flow was seen in 22.2% of PRP patients vs. 2.8% in the control group. Moderate blood flow was recorded in 75.6% (PRP) vs. 60.6% (control).

Conclusions: Intraoperative PRP therapy significantly improves the reparative regeneration of uterine tissue following cesarean section. PRP promotes hemostasis, accelerates uterine involution, enhances neovascularization, and contributes to the formation of a more robust postoperative uterine scar.