

The Menstrual Cycle and Skin Graft Take

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ABSTRACT

Background: Studies have concluded an association between menstrual hormone levels and skin grafting. In pre-ovulatory phase estrogen increases skin thickness and dermal water content, whereas progesterone levels in post-ovulatory phase may exhibit acne, psoriasis, atopic eczema, and possibly also erythema multiforme. The purpose of this study was to determine whether the timing of surgery relative to the menstrual cycle plays a role in split thickness graft take.

Objective: To compare the effect of menstrual hormones on split thickness skin graft take.

Method: It is a prospective study conducted at Liaquat National Hospital, Karachi. In this study patients with open wound were included who required split thickness graft to cover the wound. All patients were female under the age of 35 years admitted from September 2018 to October 2019, in all 40 patients were included in the studies. Surgical timings and menstrual periods were recorded. The pre-ovulatory phase referred to days 1 to 14 after the patient's last menstrual cycle, whereas the post-ovulatory phase referred to days 15 to 28.

Result: Total number of patients that were completely observed was 30. 5 patients lost to follow up and 5 patients denied participating in the studies later. 20 patients with surgery conducted at pre-ovulatory phase had complete graft take whereas 3 patients out of 10 patients who were grafted in post-ovulatory phase had some percentage of graft loss (100% vs. 70%).

Conclusion: Patients undergoing skin grafting during the postovulatory phase has some risk of graft loss as compare to pre-ovulatory phase.

Introduction

Skin grafts are standard option for closing defect that cannot be close primarily.¹ it is also the simplest way of reconstructing an area of skin loss. In this technique, piece of skin is completely detached from a donor site and transferred to cover the recipient site.² Wounds with tissue loss if allowed to heal by secondary Intention without skin grafting demonstrate greater degree of contracture and are more prone to hypertrophic scarring.¹

Skin graft requires a vascular bed and will seldom take in expose bone, cartilage or tendon devoid of their periosteal, perichondrium or paratenon. The major causes of skin graft loss are the result of the formation of seroma or hematoma under the graft that interferes directly with the imbibitions and revascularization process, and the infection of the graft that frequently leads to partial or total graft loss.^{1,3}

Graft loss causes significant stress for both patient and the surgeon. It not only increased the cost of the procedure and hospital stay but also causes skin loss which is vital for the patient.

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Women undergoing any surgical procedure during their late teens and early twenties have been shown to have female hormone levels that are at their lifetime peak. Specifically, base-line estrogen and progesterone levels are highest in this population and begin to decline as a woman approaches her thirties.⁷ during the menstrual

Cycle, these hormone levels fluctuate, allowing for ovulation and other physiologic changes. Specifically, a rise in estrogen during the preovulatory phase causes ovulation, whereas progesterone is the predominant hormone of the postovulatory phase.

Material

It was a prospective study conducted in Liaquat National Hospital, Karachi. In this study patients with open wound were included who required split thickness graft to cover the wound. All patients were female under the age of 35 years admitted from October 2018 to October 2019, in all 40 patients were included in the studies. Surgical timings and menstrual periods were recorded. The study population included women age 35 years or younger with a last menstrual period recorded in the medical record. All patients underwent skin grafting. Exclusion criteria included last menstrual period more than 30 days before surgery, concurrent hormone therapy such as oral contraceptive pills, tobacco use, and insufficient documentation. Surgical timing and postoperative complications relative to the patient's last menstrual cycle were then reviewed.

Method

The patients were divided into two groups. The first group included patients who

underwent skin grafting during the preovulatory phase of their cycle, whereas second group included patients who underwent surgery during the postovulatory phase.

Split thickness skin graft and skin mesher



Harvested split thickness skin graft, meshed



The preovulatory phase referred to days 1 to 14, with day 1 being the first day of the patient's last menstrual period. The postovulatory phase referred to days 15 to 28 of the cycle. The patients were placed into these groups based on how many days had passed since their last menstrual period and the day of surgery, and then split thickness skin grafting was done by a consultant. Split skin graft harvested using humbeys knife, which than meshed using a Derma carrier of

1x1.5. The Split skin graft secured to the recipient site using circumferential staples, followed by placement of a non-adherent dressing (bactigras). The dressings in both groups left in place until the 3rd postoperative day then the dressing was removed and the wound was evaluated by gross inspection for percentage of graft take with a ruler (in cm). Grafted area: Length (cm) × breadth (cm) = area (cm²). Then percentage of grafted area was taken by

dividing the grafted area by the total wound area multiplying by 100. Grafted area % : $\text{grafted area cm}^2 / \text{wound area cm}^2 \times 100$. Assessment of graft take was done by a consultant and only $\geq 95\%$ of graft take was considered as “effectiveness +ve”. All data was collected in pre designed proforma by the consultant To minimize bias all patients was examined by a consultant for graft take who was unaware of the study group of the patients.

The percentage of graft takes in pre-ovulatory phase versus post-ovulatory phase

Graft take Effectiveness+ve (>95%)	pre-ovulatory phase n=20	post-ovulatory phase n=10	Total n=30	P-Value
Yes	20(100%)	7(70%)	27(90%)	0.014
No	(0%)	3(30%)	3(10%)	

Results

We performed skin grafting in 40 patients in one year. All patients were female. Mean age group was 28.2 years (range 18 to 35 years). Out of 40 patients, our 20 patients (66.6%) had traumatic wound 8 patients (26.6%) and 5 patients (6.66%) post burn wound.

Discussion

In our patient population, undergoing skin grafting during the postovulatory phase of the menstrual cycle was associated with an increased risk of wound healing issues and graft loss. The postovulatory phase of the menstrual cycle consists of a decline in estrogen levels and a slow, steady rise in progesterone. Hormonal fluxes in the postovulatory phase may lead to changes in wound healing, scarring, and graft loss.

In vitro studies have shown that cultured skin cells are particularly sensitive to changes in

estrogen and progesterone, which then affect wound repair, collagen synthesis, and extracellular matrix composition. Skin with striae distensae has higher levels of progesterone receptors than normal skin, making the skin especially vulnerable to the effects of progesterone and subsequent development of striae.⁴ The effects of the menstrual cycle have been studied in multiple other specialties. There are numerous studies in the orthopedic literature supporting increased rates of ligamentous injuries during the preovulatory phase of the menstrual cycle of young women.^{5,6}

Conclusions

To our knowledge, this is the first study in the plastic surgery literature to demonstrate how skin graft is affected by the menstrual cycle. In this article, we show significantly increased skin graft loss in young women who had surgery after ovulation.

References

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