

Split-Wound Comparison of Trichophytic Closure for Donor Site in Hair Transplantation

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Background: Trichophytic closure is acceptable to provide a better cosmetic camouflage of the scar in strip harvesting technique for hair transplantation. However, the recommended trimming site of wound had never been defined.

Objective: To demonstrate the trimming site of trichophytic closure that achieved the best cosmetic outcomes

Material and Method: Ten male patients whom were performed strip harvesting technique participated in the clinical trial. Trichophytic closure was performed during wound closure. The donor site wound was divided into three segments and applied three different trimming sites including upper, lower, and both edges to each segment of wound. The outcomes, including regrowth hair density, scar width, dermatologist's and patient's satisfaction, were evaluated one, three and six months postoperative.

Results: Among the three different trimming sites, both of clinical outcome and satisfaction were not significantly different, (p -value >0.05). Additionally, the difference in improvement of scar was not detected among the three trimming sites, (p -value >0.05).

Conclusion: The three different trimming sites of trichophytic closure were performed and had the same outcomes. Therefore, surgeons can design the suitable wound closure in each patient for the best cosmetic appearance by ignoring the trimming site problem.

Keywords: Trichophytic closure, Hair transplantation, Split-wound comparison

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Over the decades, strip harvesting for hair transplantation has been acceptable as the gold standard surgery in androgenic alopecia treatment for aesthetic hair restoration⁽¹⁾. Based on the theory, hair in occipital region are not affected by testosterone hormone. Thus, the occipital area is the typical harvested donor site. The size of donor area depends on grading of hair loss, but is practically 8 to 15 millimeters in width and 18 centimeters in length, yielding approximately 1,000 to 2,000 follicular units in average⁽²⁾. Whereas, this procedure achieves a clinical success that means natural reconstruction of hairline, still a cosmetic complication has been reported^(3,4). One of long term problems in strip harvesting technique is the surgical linear scar at donor site which precipitates aesthetical and psychological problems^(5,6).

Trichophytic closure is a revolutionary

technique that helps surgeons to improve or optimize the linear scar⁽⁷⁻⁹⁾. In detail, surgeons carefully trim one side of wound edges to remove 1 millimeter from the top layer of hair follicles, and then both wound edges are overlapped each other during wound closure, (Fig. 1). Consequently, hairs will grow directly through the donor scar. As a result, the appearance of donor scar is significantly improved to look naturally in patients who performed strip harvesting technique. To our knowledge, the recommended trimming site of wound edge has never been reported. Therefore, the present study aimed to demonstrate which trimming site of trichophytic closure could provide the best cosmetic outcomes without any serious side effect.

Material and Method

The present study was designed to be an experimental clinical study. Ten male patients with androgenic alopecia whom would be performed strip harvesting technique for hair transplantation were informed to participate and enrolled in the present study and gave signed consent. This study was approved by the Siriraj Institutional Review Board,

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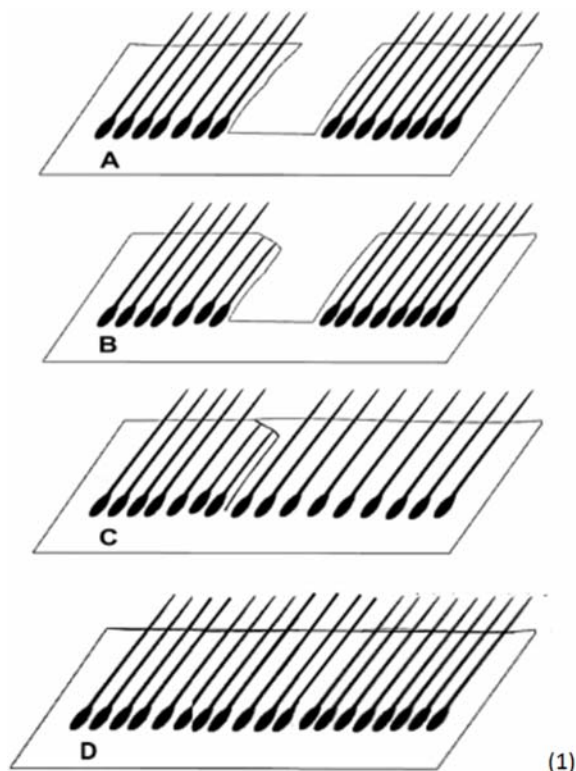


Fig. 1 Diagram of trichophytic closure after asymmetric dermal-subdermal suturing was shown. The wound edges was trimmed 1 millimeter from the top layer of hair follicles. Then both wound edges were sutured overlapped each other during wound closure.

Faculty of Medicine Siriraj Hospital (ClinicalTrials.gov Identifier: NCT01655602).

On the day of hair transplantation surgery (day 0), all of the patients had operation for harvesting the donor hair grafts at occiput area. Consequently, the incision wound at the donor site was equally divided into 3 segments, then the 3 different trimming sites of trichophytic closure including the 1-millimetre trimming of upper, lower and both edges of linear donor wounds were randomly applied to each segment during wound closure, (Fig. 2). After that, the standard operating procedure of hair transplantation was continued to complete the goal of treatment. Patients who had other hair or scalp disorders were excluded.

The outcomes including scar width, hair regrowth at the scar and dermatologist's satisfaction were evaluated in 10 androgenic alopecia patients at 1-month, 3-month, and 6-month postoperative periods. The width of donor scar was measured in centimeter for accessing healing process of trichophytic closure

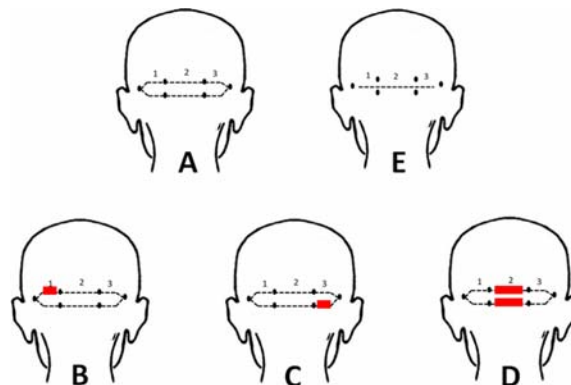


Fig. 2 Donor site of hair transplantation at occiput area was equally divided into 3 segments (right, middle and left parts) (A). All of 3 different trimming sites including upper (B), lower (C) and both edges (D) of linear donor wound were randomly applied to each segment during wound closure (E).

wound. Additionally, the hair regrowth at scar was demonstrated by the number of hair count per square centimeter at donor scar. In the aspect of outcome satisfaction, 2 dermatologists who did not know the surgeons who performed the hair transplantation and the patients marked the satisfaction score ranged from 0 (not at all satisfied) to 10 (extremely satisfied) at 6 months postoperative. On condition that dermatologists and patients were blinded about the random trimming patterns at donor wounds. Then the comparison of clinical outcomes and satisfaction scores among 3 different trimming sites of trichophytic closure were analyzed.

Statistical analysis

Descriptive analysis was applied in patients' demographic data and trichophytic closure outcomes. The compared data among 3 different trimming sites of trichophytic closure at 1-month, 3-month, and 6-month postoperative periods were analyzed by Student's t-test for continuous data and Chi-square test for categorical data.

Results

In the present study, 10 male patients with androgenic alopecia (mean \pm SD age, 32.9 \pm 5.9 years) whom were performed strip harvesting for hair transplantation and completely evaluated the outcomes at 1-month, 3-month, and 6-month postoperative periods. In the aspect of clinical outcomes including scar width and hair regrowth, there was no statistically significant difference among 3 groups, (p -value >0.05)

Table 1. The comparison among 3 different trimming sites of trichophytic closure outcomes at 1-month, 3-month, and 6-month postoperative intervals

Outcomes: postoperative period	Trimming site			<i>p</i> -value
	Upper edge	Lower edge	Both edges	
Scar width (millimeter) (SD):				
1-month	3.4 (1.8)	3.2 (1.1)	3.6 (1.5)	0.5
3-month	4.3 (1.3)	3.5 (1.0)	4.2 (1.5)	0.3
6-month	3.5 (2.0)	3.4 (1.7)	3.5 (2.2)	0.7
Hair density (growing hair counts/1 cm ²) (SD):				
1-month	50.3 (13.1)	45.9 (14.0)	44.8 (10.8)	0.6
3-month	46.1 (9.6)	47.3 (4.6)	42.5 (5.0)	0.1
6-month	46.8 (9.6)	47.3 (4.8)	45.8 (7.9)	0.7
Dermatologist's satisfaction (score 0-10):				
1-month	7.8 (0.9)	8.0 (1.2)	8.0 (1.1)	0.9
3-month	6.6 (1.2)	6.9 (1.0)	7.4 (1.6)	0.9
6-month	7.1 (1.4)	7.3 (1.6)	7.6 (1.5)	0.9
Patients' satisfaction (score 0-10):				
6-month	7.5 (2.3)	8.2 (1.5)	6.8 (3.5)	0.9



Fig. 3 Scar at donor site with trichophytic closure at 1-month (A) and 6-month (B) postoperative periods.



Fig. 4 Enlarged view of donor scars with 3 different trimming sites of trichophytic closure including upper, lower and both edges of wound at 1-month (A, B, C) and 6-month (D, E, F) postoperative periods.

(Table 1) (Fig. 3, 4). Moreover, the dermatologists and patients' satisfactions were correlative with clinical outcomes (p -value >0.05) (Table 1). Additionally, the complications of trichophytic closure were reported as follows: (i) 3 cases of hypertrophic scar and (ii) 1 case of papule lesion. Among hypertrophic scar cases, 2

patients had a previous history of keloid, however, all of them turned to be normal scars in 6 months, (Fig. 5). In the present study, there was no wound infection or inclusion cyst.

Discussion

To our knowledge, trichophytic closure is an alternative procedure for improving a surgical linear scar at donor site in strip harvesting for hair transplantation⁽⁹⁾. Based on the theory, hair regrowth along the scar makes the appearance of linear scar more natural than normal wound closure. However, the recommended trimming site of trichophytic closure has never been defined. According to the study of Yamamoto^(9,10), the result supported both-sided trichophytic excision was more effective for preventing wound dehiscence. Moreover, the scar was more natural than lower-sided trichophytic excision. However, upper-sided trichophytic excision was not included in this study and complications of trichophytic closure were not mentioned too. More than that, the strong point of our study was the comparison among 3 different trimming sites of trichophytic closure at the same setting that meant to observe wound healing process and complication of 3 groups in the one donor site wound of each patient. In the present study, the results were demonstrated that the clinical outcomes of 3 different trimming sites of trichophytic closure included (i) upper, (ii) lower and (iii) both edges of wound were no statistically significant difference. In addition

to dermatologists and patients' opinions, there were also no difference in satisfaction among the 3 groups. Due to the same outcomes of 3 different trimming sites of trichophytic closure, surgeons could design the suitable trimming site of wound edge in each patient for the best cosmetic appearance and ignore the trimming site problem. Furthermore, the time of wound healing was observed. The results showed that each trimming site of trichophytic closure spent time approximately 1 week to heal similar to simple wound closures such as simple suture or mattress suture. Thus, the strength of trichophytic closure wound was supposed to be equal to the simple wound closure,

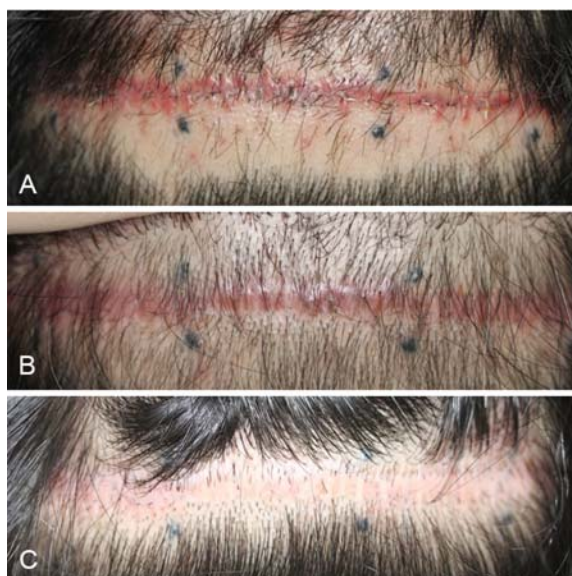


Fig. 5 Hypertrophic scar of trichophytic closure was evaluated at 1-month (A), 3-month (B), and 6-month (C) postoperative periods.



Fig. 6 Wound healing of trichophytic closure at 1-week postoperative period.

(Fig. 6). Moreover, the complications including papular lesion and hypertrophic scar were reported in the present study. In our study, the complication incidence in trichophytic closure was 3 cases which was not different from the simple wound closure⁽¹¹⁾. Therefore, trichophytic closure did not increase hypertrophic scar rate in general population. Moreover, the hypertrophic scar which occurred in trichophytic closure turned to be normal scar within 6 months, same as simple wound closures. However, hypertrophic scar formation was depended on surgeon and sutures used to close wounds. In the aspect of wound infection, there was no report in the present study. It might be due to the limitation of small sample size. Thus, the risk of wound infection of trichophytic closure should be observed in the further study.

In conclusion, trichophytic closure was acceptable as a revolutionary technique for improving the appearance of linear scar at donor site of strip harvesting technique for hair transplantation. Surgeons were able to apply these techniques by ignoring which will be the best recommended trimming site. The suitable trimming site of wound was designed differently in each patient for achieving the best cosmetic outcomes.

However, a limitation of the present study was the relatively small sample size. For this reason, these findings could not be generalized to the broader community based practice on this study alone. A meta-analysis should be used to combine the results from multiple studies in an effort to increase power over individual studies, resolve uncertainty when reports disagree.

What is already known on this topic?

Trichophytic closure is acceptable to achieve a better cosmetic camouflage of the scar in strip harvesting technique hair transplantation.

What this study adds?

Whatever the trimming sites of trichophytic closure, it helped to improve the cosmetic outcome of linear scar at donor site.

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Potential conflicts of interest

None.

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การศึกษาเปรียบเทียบผลการเย็บปิดแผลผ่าตัดปลูกถ่ายเส้นผมส่วนโดว์เนอร์โดยวิธีไตรโคไฟติกแบบต่าง ๆ

รัฐพล ดวงทอง, สุเพ็ญญา วโรทัย, ครัลพร ไตรวงศ์วรรณ, กมลวรรณ พงศ์ปริตร, ชูดา รุจิธรรณวงศ์

ภูมิหลัง: การผ่าตัดปลูกถ่ายเส้นผมวิธีมาตรฐาน เพื่อรักษาโรคผมบางทางพันธุกรรม (strip harvesting technique) มักเกิดปัญหาแผลเป็นยาวที่บริเวณโดว์เนอร์ การเย็บปิดแผลผ่าตัดโดยวิธีไตรโคไฟติกเป็นวิธีการเย็บปิดแผลรูปแบบหนึ่งที่มีก้นมาประยุกต์ใช้กับแผลผ่าตัดในบริเวณที่มีเส้นผม เนื่องจากก่อนเย็บปิดบาดแผลมีการตัดขอบแผลเฉียงออกประมาณ 1 มิลลิเมตร แล้วเย็บปิดขอบแผลทั้ง 2 ด้านให้เกยกัน เพื่อให้เส้นผมงอกขึ้นมาอำพรางตรงบริเวณแผลเป็น ดังนั้นการเย็บปิดแผลผ่าตัดโดยวิธีไตรโคไฟติกจึงเป็นทางเลือกในการแก้ไขปัญหาแผลเป็นยาวที่เกิดจากการผ่าตัดปลูกถ่ายเส้นผม แต่อย่างไรก็ตามในปัจจุบันยังไม่มีแนวทางปฏิบัติมาตรฐานเกี่ยวกับการเย็บปิดแผลผ่าตัดด้วยวิธีดังกล่าว

วัตถุประสงค์: ศึกษาเปรียบเทียบแผลผ่าตัดที่เย็บปิดโดยวิธีไตรโคไฟติก 3 รูปแบบดังนี้ 1) ตัดริมขอบแผลบน 1 มิลลิเมตร 2) ตัดริมขอบแผลล่าง 1 มิลลิเมตร 3) ตัดริมขอบแผลทั้งบนและล่าง 1 มิลลิเมตร

วัสดุและวิธีการ: ผู้ป่วยชายโรคผมบางทางพันธุกรรม 20 รายที่เข้ารับการผ่าตัดปลูกถ่ายเส้นผมวิธีมาตรฐาน บริเวณแผลผ่าตัดที่โดว์เนอร์จะถูกแบ่งออกเป็น 3 ส่วนเท่ากันและสุ่มเลือกวิธีการเย็บปิดแผลผ่าตัดไตรโคไฟติก 3 รูปแบบให้กับแผลผ่าตัดแต่ละส่วน ตรวจติดตามแผลเย็บปิดที่ระยะเวลา 1, 3, 6 เดือนหลังการผ่าตัด เพื่อประเมินแผลผ่าตัด อัตราการงอกของผมบริเวณแผลโดว์เนอร์ รวมทั้งประเมินความพึงพอใจของแพทย์และผู้ป่วย

ผลการศึกษา: หลังสิ้นสุดการติดตาม 6 เดือนหลังการผ่าตัด ผลการประเมินในแง่ของอัตราความหนาแน่นของเส้นผมที่งอกใหม่บริเวณแผลโดว์เนอร์ ความกว้างของรอยแผลโดว์เนอร์ และความพึงพอใจของแพทย์ต่อการเย็บปิดแผลผ่าตัดไตรโคไฟติกทั้ง 3 รูปแบบที่ระยะเวลา 1, 3 และ 6 เดือนไม่มีความแตกต่างกันทางสถิติ รวมทั้งความพึงพอใจของผู้ป่วยต่อการเย็บปิดแผลผ่าตัดไตรโคไฟติกทั้ง 3 รูปแบบที่ประเมิน 6 เดือนหลังการผ่าตัด ก็ไม่มีความแตกต่างกันทางสถิติเช่นกัน ($p\text{-value} > 0.05$)

สรุป: การเย็บปิดแผลผ่าตัดไตรโคไฟติกเป็นเทคนิคที่ได้รับการยอมรับในการตกแต่งลดรอยแผลเป็นยาว จากการศึกษาที่พบว่า การตัดขอบแผลทั้ง 3 รูปแบบของการเย็บปิดแผลผ่าตัดไตรโคไฟติกได้ผลลัพธ์ในแง่ของอัตราการงอกของผมและความกว้างของแผลเป็นโดว์เนอร์ รวมทั้งความพึงพอใจของแพทย์และผู้ป่วยไม่แตกต่างกัน ดังนั้นการเลือกตัดขอบแผลในการเย็บปิดแผลผ่าตัดไตรโคไฟติกจึงขึ้นอยู่กับดุลพินิจของแพทย์ เพื่อให้เกิดความเหมาะสมกับผู้ป่วยในแต่ละคนมากที่สุด
