

World Journal of *Clinical Cases*

World J Clin Cases 2023 June 16; 11(17): 3932-4209



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INDEXING/ABSTRACTING

The WJCC is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Current Contents®/Clinical Medicine, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 Edition of Journal Citation Reports® cites the 2021 impact factor (IF) for WJCC as 1.534; IF without journal self cites: 1.491; 5-year IF: 1.599; Journal Citation Indicator: 0.28; Ranking: 135 among 172 journals in medicine, general and internal; and Quartile category: Q4. The WJCC's CiteScore for 2021 is 1.2 and Scopus CiteScore rank 2021: General Medicine is 443/826.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Hua-Ge Yin; Production Department Director: Xiang Li; Editorial Office Director: Jin-Lei Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

June 16, 2023

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INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

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PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Successful reconstruction of an ankle defect with free tissue transfer in a hemophilia A patient with repetitive hemoarthrosis: A case report

Dong Yun Lee, SooA Lim, SuRak Eo, Jung Soo Yoon

Specialty type: Surgery

Provenance and peer review:

Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B, B
Grade C (Good): 0
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Papazafiropoulou A, Greece; Shahriari M, Iran

Received: February 6, 2023

Peer-review started: February 6, 2023

First decision: April 26, 2023

Revised: May 2, 2023

Accepted: May 16, 2023

Article in press: May 16, 2023

Published online: June 16, 2023



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Abstract

BACKGROUND

Hemophilia, an uncommon yet consequential hereditary bleeding disorder, manifests as two clinically indistinguishable forms that hinder the normal functioning of the coagulation cascade. This impairment renders individuals more susceptible to excessive bleeding during significant surgical interventions. Moreover, individuals with severe hemophilia frequently encounter recurring hemarthrosis, resulting in progressive joint destruction and, subsequently, the need for hip and knee replacement surgeries.

CASE SUMMARY

The patient was a 53-year-old man with hemophilia A as the underlying disease and had self-injected factor VIII twice weekly for several decades. He had undergone ankle fusion surgery for recurrent hemarthrosis at the Department of Orthopedic Surgery 1 mo prior and was referred to our department because of skin necrosis after a hematoma at the surgical site. An anterolateral thigh perforator free flap was created after three cycles of factor VIII administration in addition to the concomitant administration of tranexamic acid (TXA) (Transamin 250 mg cap, 1 cap tid, q8h). After the operation, from postoperative days (PODs) 1-5, the factor VIII dose and interval were maintained, and q12h administration was tapered to q24h administration after POD 6. Because the patient's flap was stable 12 d after the operation, factor VIII administration was tapered to twice a week. At 6 mo follow-up, the patient recovered well without any complications.

CONCLUSION

To the best of our knowledge, there are very few reports of successful free flaps in patients with hemophilia, and none have been reported in patients with hemophilia A. Moreover, there are several reports on the efficacy of TXA in free flaps in general patients; however, there are no case reports of combining factor

VIII and TXA in patients with hemophilia. Therefore, we report this case to contribute to future academic research.

Key Words: Free tissue transfer; Anterolateral thigh free flap; Hemophilia A; Hemoarthrosis; Factor VIII; Tranexamic acid; Case report

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Core Tip: To our knowledge, there are very few reports of successful free flaps in patients with hemophilia, and none have been reported in patients with hemophilia A. Moreover, there are several reports on tranexamic acid efficacy in free flaps in general patients, but there are no case reports of combining factor VIII and tranexamic acid in hemophilia patients. Therefore, we report this case to contribute to future academic research.

Citation: Lee DY, Lim S, Eo S, Yoon JS. Successful reconstruction of an ankle defect with free tissue transfer in a hemophilia A patient with repetitive hemoarthrosis: A case report. *World J Clin Cases* 2023; 11(17): 4079-4083

URL: <https://www.wjgnet.com/2307-8960/full/v11/i17/4079.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v11.i17.4079>

INTRODUCTION

Hemophilia is a rare but serious inherited bleeding disorder. Hemophilia encompasses two primary forms: Hemophilia A, with an incidence of 1 in 5000 male live births, characterized by a deficiency of factor VIII, and hemophilia B, with an incidence of 1 in 25000 male live births, characterized by a deficiency of factor IX. Clinically, both forms are indistinguishable and share a common consequence of impairing the coagulation cascade, resulting in an augmented propensity for bleeding during major surgical procedures[1]. Furthermore, individuals with severe hemophilia experience recurrent hemarthrosis, leading to progressive joint destruction that often necessitates hip and knee replacement surgeries[1,2]. This bleeding tendency in patients with hemophilia presents a challenge for plastic surgeons performing microvascular procedures. If such coagulopathy is not adequately treated and microvascular surgery is performed, persistent anastomotic hemorrhage may threaten the viability of the flap owing to the compression of the vascular pedicle by nascent hematomas. Conversely, overcorrecting the hemorrhagic tendency may lead to a hypercoagulable state, resulting in vascular thrombosis and flap loss[3]. To the best of our knowledge, there have been few reports on microsurgery in patients with hemophilia A worldwide; however, there are very few reports on free fasciocutaneous flaps[4]. We report a case of successful free tissue transfer for skin and soft tissue defects after ankle fusion surgery for the correction of repetitive hemarthrosis in a patient with hemophilia A.

CASE PRESENTATION

Chief complaints

The patient was referred to our department because of skin necrosis after a hematoma at the surgical site.

History of present illness

He had undergone ankle fusion surgery for recurrent hemarthrosis at the Department of Orthopedic Surgery 1 mo prior.

History of past illness

He was a 53-year-old man with hemophilia A as an underlying disease who had self-injected factor VIII twice weekly for several decades.

Personal and family history

He was a 53-year-old man with hemophilia A without any other past medical history nor family history.

Physical examination

The defect size was 4.0 cm × 7.0 cm and was accompanied by partially necrotic tendon exposure

(Figure 1A).

Laboratory examinations

The baseline factor VIII level before flap surgery was 3% of the normal value, and the prothrombin time international normalized ratio was within normal levels, but the activated partial thromboplastin time level was prolonged (59.2 s, reference value 24.8–34.6 s).

Imaging examinations

Computed tomography angiography for lower extremity was performed for identifying patency of vessels and there was no obstruction nor stenosis.

FINAL DIAGNOSIS

Considering the wound condition, an anterolateral thigh perforator free flap was planned rather than a rotational flap.

TREATMENT

In consultation with the hematologist, administration of factor VIII (GreenMono, 25 IU/kg) q12h with tranexamic acid (TXA) from 12 h before surgery was performed to maintain F VIII targets at 80%–100% before surgery.

An anterolateral thigh perforator free flap was created after three cycles of factor VIII administration. The flap size was 4.5 cm × 10.0 cm, and the pedicle used was the lateral circumflex femoral artery (Figure 1B). The pedicle length was 8 cm. End-to-side arterial and venous anastomoses were also performed. Milking tests and intraoperative Doppler confirmed that blood flow and peripheral circulation were intact by observing flap margin bleeding and skin blanching. For a smooth flap inset, the bulky soft tissue was defatted. The flap was inserted without tension and covered the defect bulkily (Figure 1C). Split-thickness skin grafting was performed over the partial pedicle site to reduce flap tension. No postoperative complications, such as arterial insufficiency or venous congestion, were observed, and the flap was stable without revision operations during admission.

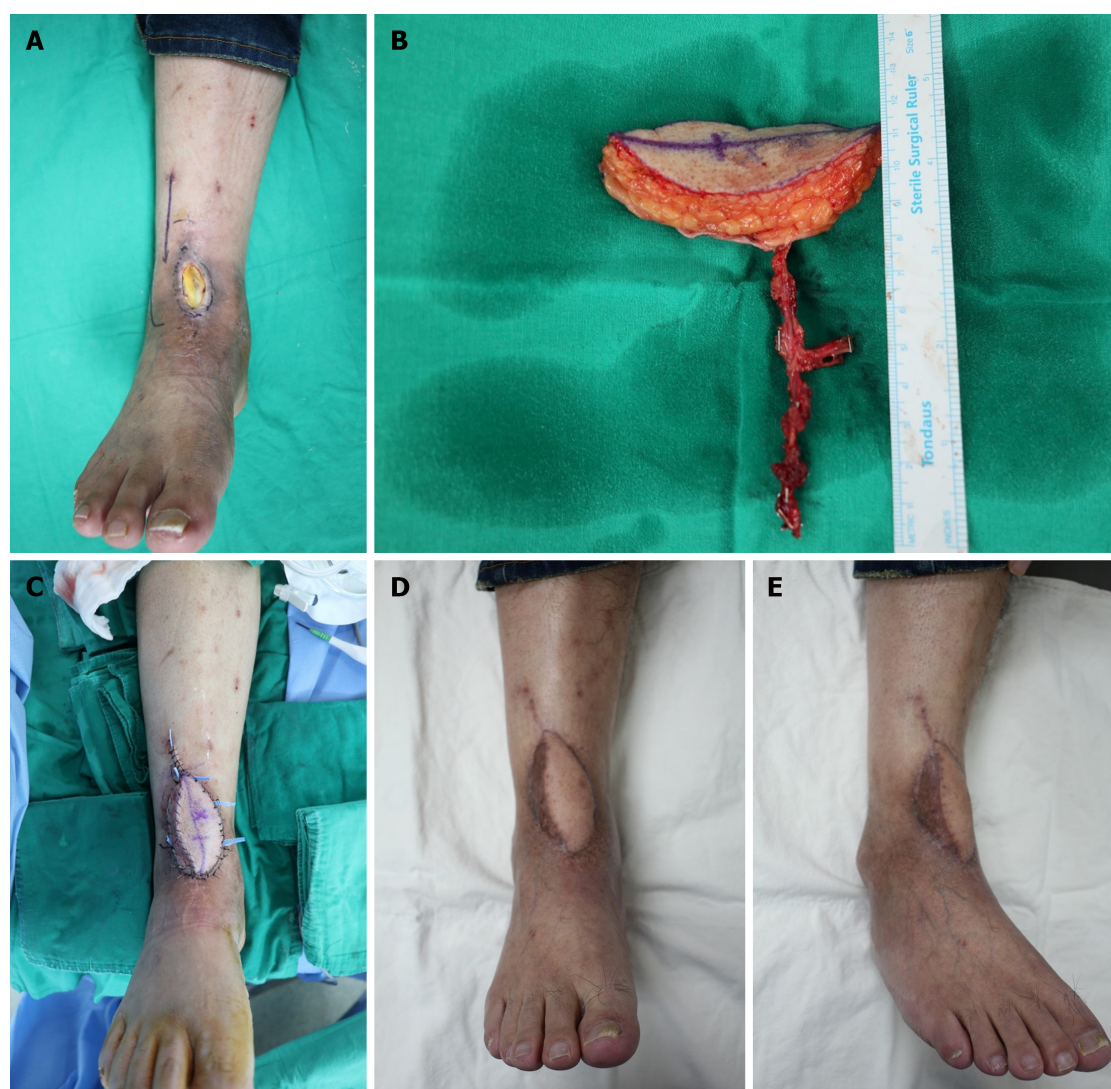
OUTCOME AND FOLLOW-UP

After the operation, from postoperative days (PODs) 1–5, the factor VIII dose and interval were maintained, and q12h administration was tapered to q24h administration after POD 6. Prostaglandin E1 (Eglandin, 10 mcg/2 mL, 20 mL/h) was administered from PODs 1 to 6 as an auxiliary regimen. Low-dose aspirin (100 mg qd) was considered in cases of venous congestion or thrombotic event; however, no such event was observed during hospitalization. Because the patient's flap was stable 12 d after the operation, factor VIII administration was tapered to twice a week. At 6 mo follow-up, the patient recovered well without complications (Figure 1D and E).

DISCUSSION

In the past, surgical procedures posed considerable challenges and substantial risks for patients with hemophilia, including uncontrollable bleeding, hemolytic complications due to impure concentrates, blood-borne infections, and impaired wound healing[1,2]. However, with the progression of hemophilia treatment modalities and the development of effective bridging strategies to address deficiency factors, surgical procedures can now be conducted with greater safety and improved outcomes[2]. Although many advances have been made, an accurate protocol may be more important for patients with hemophilia undergoing microvascular free tissue transplantation because of the relatively long operative time and the importance of hemodynamic stability in flap survival[1-3].

Hemophilia can be classified into three categories according to plasma coagulant factor levels: severe (less than 1% of the normal value), moderately severe (1%–5%), and mild (5%–40%)[2]. Generally, the treatment goal is to raise factor VIII concentrations to 80%–100% just 24 h before surgery, and a level of at least 50% should be maintained on PODs 5–14[5]. One unit of factor concentrate per kilogram of body weight is expected to increase plasma factor VIII levels by approximately 2%[4]. The following formula is used[5]: Factor VIII dose (IU) = desired factor activity (%) × weight (kg) × 0.5. The determination of the target factor value can be achieved by carefully considering the type of surgery and the anticipated level of bleeding.



DOI: 10.12998/wjcc.v11.i17.4079 Copyright ©The Author(s) 2023.

Figure 1 A 48-year-old man with an open wound on the right anterior ankle. A: Preoperative view; B: Intraoperative view. A right anterolateral thigh (ALT) perforator free flap was harvested; C: ALT perforator free flap inset for coverage of the anterior ankle defect; D: Postoperative 9 mo view (anterior); E: Postoperative 9 mo view (lateral) showing the decreased bulkiness of the flap. Ongoing hematologic tests showed normal results, and the wound recovered without any surgical complications.

In our case, the patient had a preoperative factor VIII level of 3%, which was moderately severe. He was successfully treated with four vials of factor VIII (GreenMono 538 IU) administration per day, which is the recommended dose in the literature, in addition to the concomitant administration of TXA (Transamin 250 mg cap, 1 cap tid).

TXA is a synthetic lysine-analog antifibrinolytic that competitively inhibits the conversion of plasminogen to plasmin[6]. In 2018, Lardi *et al*[7] performed a retrospective single-center cohort study to evaluate the safety and benefits of TXA in 63 free tissue transfers for immediate breast reconstruction. TXA administration did not increase thrombosis during free tissue transfer and resulted in a reduced hematoma rate. TXA is considered a safe and reasonable adjunct therapy for patients with anemia and high intraoperative or postoperative blood loss[6-8]. According to the estimated blood loss during the intraoperative or postoperative period, up to 3 g of TXA was administered intravenously[8]. The only FDA-approved usage of TXA is for heavy menstrual bleeding and short-term prevention in patients with hemophilia; however, off-label intravenous TXA is used in surgical operations to reduce blood loss in patients without hemophilia[7,8]. Indeed, in plastic surgery, the role of TXA is rapidly increasing[6, 7], and when conducting an article review by Klifto *et al*[8] on patients who underwent flap-based reconstruction surgery, excellent efficacy can be confirmed. However, because TXA passes through the blood-brain barrier, a previous study showed that seizure risk increases when an excessive dose is administered; therefore, an appropriate dose should be maintained. The effective plasma concentration of TXA for antifibrinolysis has been reported to be 5–10 µg/mL or 10–16 µg/mL, depending on the indications[8].

CONCLUSION

To the best of our knowledge, there are very few reports on successful free flaps in patients with hemophilia, and none have been reported in patients with hemophilia A. Moreover, there are several reports on the efficacy of TXA in free flaps in general patients, but there are no case reports of combining factor VIII and TXA in patients with hemophilia. Therefore, we report this case to contribute to future academic research.

FOOTNOTES

Author contributions: Lee DY and Yoon JS designed the research study; Lee DY, Lim S, Eo S and Yoon JS performed the research; Lee DY and Yoon JS analyzed the data and wrote the manuscript; All authors have read and approve the final manuscript.

Informed consent statement: Informed consent for treatment was obtained and attached as a separate file.

Conflict-of-interest statement: The authors declare that they have no conflict of interest.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

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S-Editor: Liu JH

L-Editor: A

P-Editor: Cai YX

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