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CASE REPORT

# Application of Free Flap Failure Predictability index

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## ABSTRACT

Even though the benefit of free tissue transfer is uncontested in complex reconstructive cases, vascular compromise and flap failure remain a challenge for the surgeon and identification of possible risk factors can aid in the preoperative planning.[1] The aim of this study was to identify retrospectivelyand predict the pre-operative risk of flap failure in a patient with failed flaps. This is a 'reflection' to aid better optimisation/individualisation in the future in our unit.

## KEYWORDS

• Free Flap Failure • Predictability Index • Free Tissue Transfer

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## INTRODUCTION

Free flap transfer is a reliable method to reconstruct head and neck defects and has a success rate of about 95% but it is a complexing challenge. Free flap failure, is considered an unavoidable nightmare for both patients and surgeons. The limited choice of free flap donor siteand recipient vessels makes redo-operations even more intimidating and has prompted numerous studies of ways to prevent free flap failure. An index article, by Mc lean *et. al* studying the various risk factors, published in 2020, was used as a reference.

The defect was characterised in the study as -a) secondary to cancer either a) primarily during resection or as a b) second stage procedure, c) trauma and infections. Each of these categories was scored 1, 2 and 3 points respectively. Comorbidities were each scored 1 point each- diabetes mellitus, hypertension, peripheral vascular disease, smoking, coronary artery disease. Predictability of flap failure is an additive of these individual scores

Low risk - index 1 and 2

Moderate risk - index 3,4 and 5

High risk – index 6,7 and 8

## MATERIAL AND METHODS

Patient is a 32 year old male with a right sided open both bones of legs fracture type 3b. After initial resuscitation he had undergone a open reduction and external fixation. 3 months post surgery, our reconstructive surgical team was called in to assess and plan for coverage of a well granulated defect. An anterolateral thigh free flap was used for reconstruction. However, flap failure had occurred, noticeable from day 2, as depicted in the images (figure 1).

The predictability index was applied to this patient.



**Figure 1:** Flap appearance on Pos-op day 2



**Figure 2:** Flap appearance on Post-op day 4

## RESULTS

The patient falls under 'trauma and soft tissue infection'- was scored three. He was found to have diabetes mellitus; no signs or symptoms of CAD, peripheral arterial disease, or hypertension. He is a Smoker with a pack year index of two. His risk index was found to be five, hence falling in the moderate risk category with a free flap failure 9.3 times higher than the low risk group.

## DISCUSSION

Free flap failure, is a disaster for both patient and surgeon. free flap donor sites are limited, and redo-operations are often difficult and intimidating to even experienced surgeons. A Japanese national database research defined free flap failure as "the need for reoperation, recorded as free flap reconstruction or pedicle flap reconstruction under general anesthesia after the primary surgical procedure".[2]

The advances achieved in microsurgery have given surgeons the armamentarium to deal with some of the most complex defects.[3,4] Free tissue transfer has achieved widespread popularity and can be considered a safe and reliable method, yielding success rates between 92.3% and 98%. Even though the benefit of free flap reconstruction is uncontested in successful cases, vascular compromise and/or flap failure still remain a challenge for the surgeon, and identification of possible risk factors can aid in the preoperative planning and counselling of the patient.[5]

After free tissue transfer, the flap is initially perfused solely through the anastomosed microvascular circulation. Endothelialisation occurs across the anastomotic line and is essentially complete by 2 weeks.[6] Reperfusion of the flap also occurs from the periphery and from the wound bed through vasculogenesis and angiogenesis. Therefore, it is during the initial postoperative period that the risk of flap failure is the highest, when the flap is solely perfused by an incompletely endothelialized microvascular circulation.[7]

A healthy flap that is well perfused will be pink, minimally swollen in the postoperative period and warm to the touch. Capillary refill is commonly 2 to 3 seconds in duration and is assessed by applying and releasing pressure on a skin paddle with a fingertip and observing the initial pallor from direct pressure followed by return of a pink colour from reperfusion.[8] Signs of a congested (venous compromised) flap include a bluish colour, increased swelling and warmth, and shortened capillary refill (<2 seconds). In the case of ischemia (arterial compromised flap), the flap will be pale in colour, cold, and will have a delayed capillary refill.[9]

The limitation of our study is that, since this single case report study, definite conclusions cannot be made. This study can also be used as the basis for a larger prospective study to determine the efficacy of the free flap failure predictability index.

## CONCLUSION

Predicting free flap outcomes prior to surgery can be useful in choosing patients who need more frequent monitoring and probable salvage methods. This index allows the reconstructive surgeon to stratify the risk for vascular compromise and in certain situations, it may aid in adjusting the reconstructive plan and optimisation of the patient.

**Conflicts of interest**: None

**Disclosures**: None

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