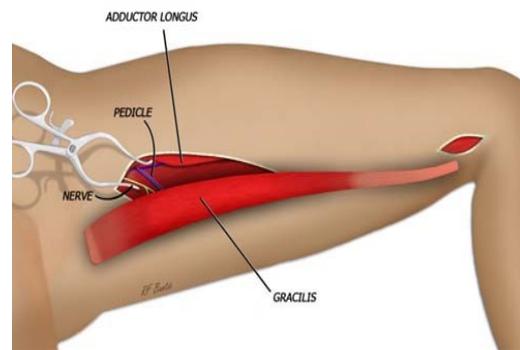
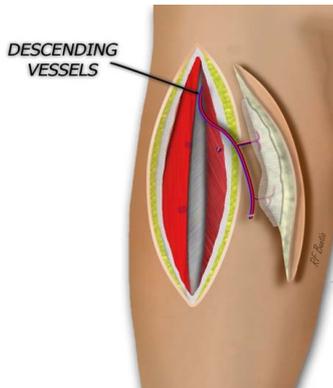


Free Flap Fact Sheet

What is a free flap?

Free flap surgery involves the transfer of a patient's own tissue from a donor site to a recipient site, which is typically the site of a defect. The donor site usually has a distant location with respect to the recipient site. Therefore in order to physically transfer tissue while maintaining its viability that tissue's vascular supply must be divided at the donor site and then reconnected through the creation of anastomosis at the recipient site.

There are **Fasciocutaneous** free flap and **Muscle** free flaps see images below.



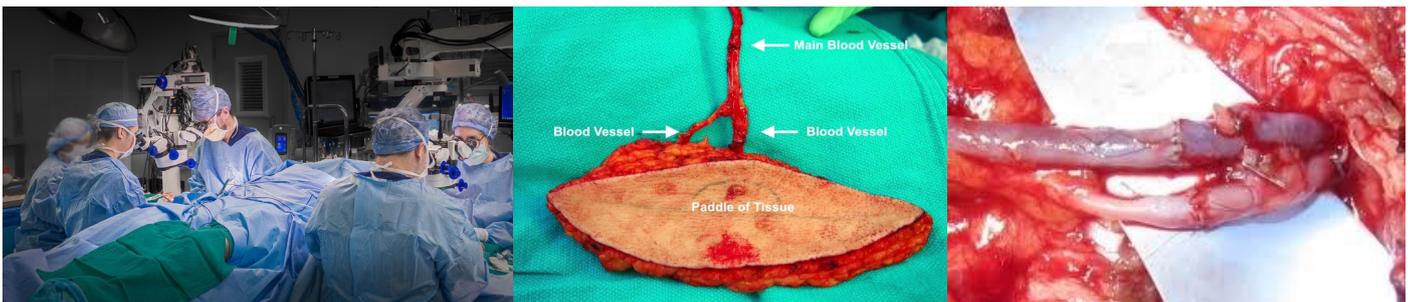
ALT fasciocutaneous free flap

Gracilis Muscle flap

Microsurgery

Microsurgery is a specialised form of surgery performed with the aid of an operation microscope and involves the use of a range of advanced techniques designed for working on very fine structures such as nerves and blood vessels.

In free flaps a donor area with abundant suitable tissue is selected, from which tissue is removed and transferred to the reconstruction site. Blood vessels are then re-connected, establishing blood flow and allowing the tissue to fully integrate within the new location. These sophisticated techniques enable the reconstruction of almost any tissue in the body.



What are the indication for using a free flap?

Trauma, post tumour resection, congenital defects or chronic wounds where a free flap would give the optimum functional result or aesthetic.

- Large defects
- Defects requiring multiple tissue types
- Areas that need freshly vascularised tissue.
- No local options for flap

Caring for a patient with a free flap

When is the most critical for a patient with a free flap?

Free flap vascular problems typically occur during the first 72 hours post op. Free flaps are generally monitored starting immediately postoperatively until at least day 3 and in some cases for additional days depending on the nature of the procedure (e.g. difficulty) and surgeon preference.

Monitoring of a free flap patient ?

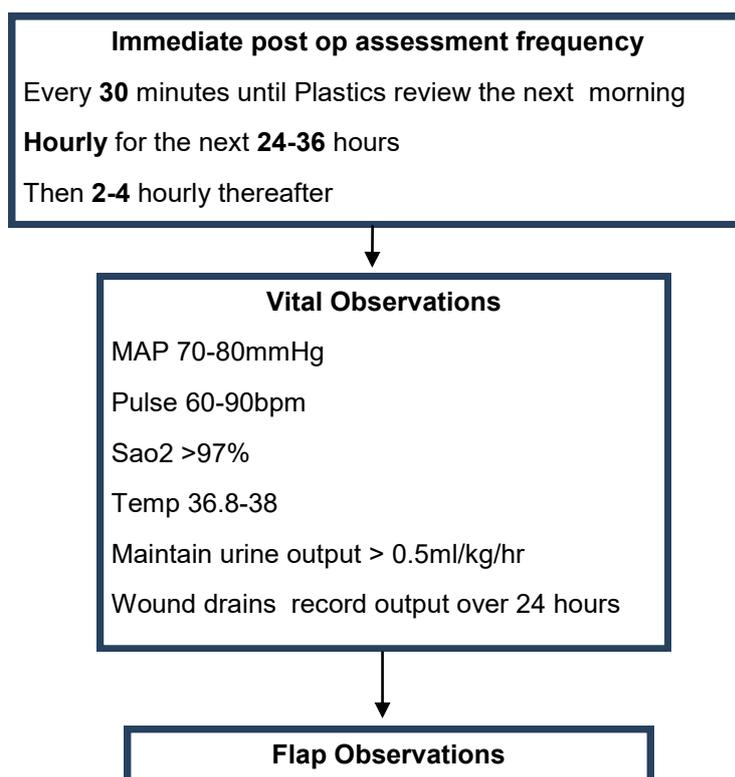
The likelihood of salvaging a failing free flap improves if the delay between the onset of a vascular problem and surgical intervention to correct that problem is reduced excessively. Long delays before intervention, during which the flap is ischemic, can result in partial or total flap loss. For this reason, free flaps are typically monitored frequently (every 30- 60 minutes) especially during the first few days postoperatively to identify vascular compromise as soon as possible so that action can be taken.

Immediately post op assessment frequency

- Every 30 minutes until Plastics Consultant review following day.
- Hourly for the next 24- 36 hours.
- 2- 4 hourly thereafter

What is more important Flap observation or Vital signs?

Both are as equally as important. To complete the flap observation process you need to do a full set of vital observations this includes fluid balance.



On the following page are the page are the flow charts for Fasciocutaneous free flaps and Muscle free flaps.

Flow chart for Fasciocutaneous flaps observation

Aim: To provide guidance for flap observation.

CAUTION: This is intended to serve as a general statement regarding appropriate patient care practices based upon the available medical literature and clinical expertise at the time of development. They should not be considered to be accepted protocol or policy, nor are intended to replace clinical judgment or dictate care of individual patients.

On arrival to the ward

Review op notes and post op instructions

- Handover from surgeon
- Patient positioning
- Oxygen fluids Analgesia Antiemetics anticoagulation
- Check dressing is dry and intact
- Roll patient to check pressure areas and make sure drains are patent
- Monitor wounds and drain output

Immediate post op assessment frequency.
Every **30** minutes until Plastics review the next day
Hourly for the next **24-36** hours
Then **2-4** hourly thereafter

Vital Observations

MAP 70-80mmHg
Pulse 60-90bpm
Sats O2 >97%
Temp 36.8-38
Maintain urine output > 0.5ml/kg/hr
Wound drains record output for each 24 hour period
Fluid Balance to monitor input and output

Abnormal

Normal

Document all findings

Normal

Flap Observations

Skin colour
Skin texture
Skin temperature
Capillary refill
Doppler sounds

Abnormal

REPORT URGENTLY TO SENIOR NURSE TO RECHECK OBSERVATIONS. CALL PLASTIC CONSULTANT

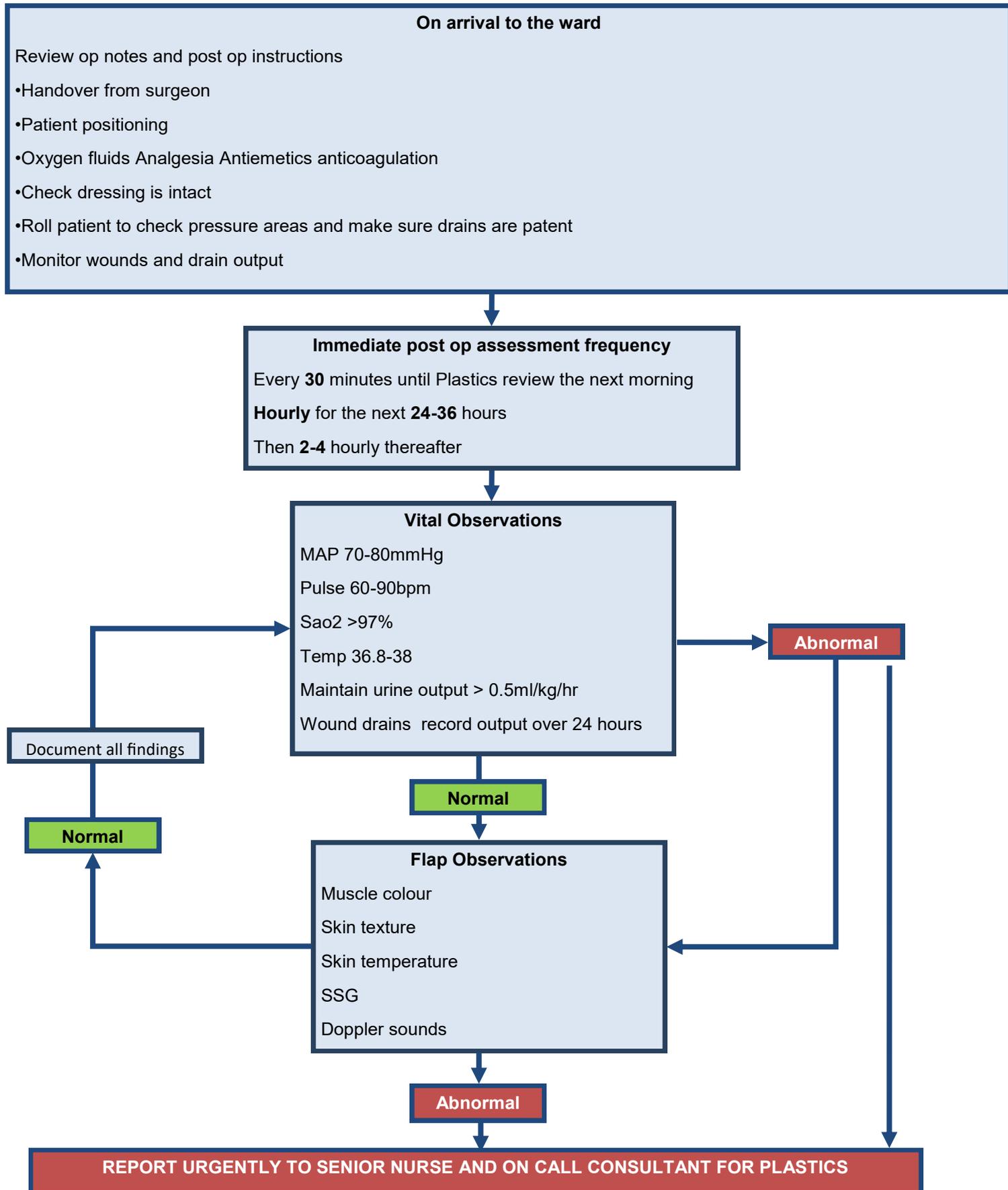
Post op care guidelines following Fasciocutaneous Free Flap surgery

Vital signs	BP	MAP 70-80mmHg	Low BP and abnormal pulse may indicate hypovolaemia, which indicates inadequate blood supply to the flap
	Pulse	60 –90	Compare with pre op Tachycardia can indicate the patient is in pain. This results in adrenaline being released causing vasoconstriction- resulting in poor perfusion of the flap
	Sats O2 RR	>97%	Low SaO2 may lead to inadequate tissue perfusion . A raised respiratory rate may indicate pain or anxiety. Meaning adrenaline is being released causing vasoconstriction- resulting in poor perfusion of the flap.
	Temp	36.5-38	
Urine output	>0.5ml/kg/hr		Is indicative for tissue perfusion. Poor output can indicate dehydration which leads to inadequate perfusion of the flap Keep patient hydrated monitor intake Ensure IV fluids are prescribed
Flap observations	Colour	Observe for any change in colour. Pale, blue or dark red colours indicate there reduced arterial supply or venous return	
	Texture	Flaccid/ Empty flap may indicate poor arterial supply Firm / Swollen flap can indicate venous congestion	
	Capillary refill	Brisk refill may indicate venous congestion Prolonged refill may indicate poor arterial supply	
	Temp	Cold- indicates inadequate blood supply Increased warmth- could indicate an abnormal inflammatory response	
Doppler signal	Watch for any change in the Doppler signal	Double check with senior nurse Report to Plastics consultant.	
Wound drains	Monitor the wounds and drains (amount and colour).	Excess drainage can indicate active bleeding	
Positioning	Follow post op instructions	This is important to avoid pressure, kinking or tension of vessels and also to control swelling.	

ANY CONCERNS REPORT TO SENIOR NURSE & CALL PLASTIC CONSULTANT

Flow Chart for Muscle Free Flaps Observation

Muscle flaps can be particularly difficult to monitor. If a muscle free flap has been skin grafted, then the colour assessment is performed differently. In these cases it is the colour of the muscle that is assessed which should be red under normal circumstances. Muscle tissue that appears a pale or purple colour suggests an underlying vascular problem. Capillary refill assessment applies only to free flaps with a skin paddle and cannot be performed in muscle free flaps that have been skin grafted.



Post Op Care Guidelines Following Muscle Free Flap Surgery

Vital signs	BP	MAP 70-80mmHg	Low BP and abnormal pulse may indicate hypovlaemia which indicates inadequate blood supply.
	Pulse	60-90	Compare with pre op. Tachycardia can indicate pain which results in adrenaline being realised causing vasoconstriction –resulting in poor perfusion of the flap.
	Sats O2 RR	>97%	Low SaO2 may lead to inadequate tissue perfusion. A raised respiratory rate may indicate pain or anxiety. Meaning adrenaline is being released causing vasoconstriction – resulting in poor perfusion of the flap
	Temp	36.5– 38	
Urine output	>0.5ml/kg/hr		Is indicative for tissue perfusion. Poor output can indicate dehydration which leads to inadequate perfusion of the flap. Keep patient hydrated and monitor fluid intake. Ensure IV fluids are prescribed.
Flap observations	Colour		Observe for any changes in muscle colour. Pale or purple in colour indicates reduced arterial supply or venous return.
	Texture		Flaccid / Empty flap may indicate poor arterial supply. Firm / Swollen flap may indicate venous congestion.
	Temp		Cold—indicates inadequate blood supply. Increased warmth—could indicate an abnormal inflammatory response.
	SST		If the SST is not looking healthy and normal this could be a indication of poor perfusion.
Doppler signal	Watch for any changes in Doppler signal		Double check with senior nurse. Report to Plastics consultant.
Wound drains	Monitor the wound drains (amount and colour)		Excess drainage can indicate active bleeding.
Positioning	Follow post op instructions		This is important to avoid pressure, kinking or tension of the vessels and control swelling.

REPORT URGENTLY TO SENIOR NURSE AND ON CALL CONSULTANT FOR PLASTIC

CAUTION: This information is intended to serve as a general statement regarding appropriate patient care practices based upon the available medical literature and clinical expertise at the time of development. This should not be considered to be accepted protocol or policy, nor are intended to replace clinical judgment or dictate the care of individual patients.

How vital observations impact on the patients free flap ?

Blood pressure

A low BP and abnormal pulse may indicate hypovolaemia, which indicates inadequate blood supply to the flap.

Pulse

Tachycardia can indicate the patient is in pain. Meaning adrenaline is being released causing vasoconstriction- resulting in poor perfusion of the flap.

Sats

Low sats means the body is having difficulty delivering oxygen to the cells, tissue and organs. This will result in the oxygen supply to the flap will be poor resulting in poor perfusion.

Temperature

A low temperature vasoconstriction will occur reduce loss of body heat in cold temperatures control how blood is distributed throughout your body send more nutrients and oxygen to organs that need them protect your body against blood and fluid loss. Resulting in poor perfusion of the flap.

RR

A raised respiratory rate may indicate pain or anxiety . Meaning adrenaline is being released causing vasoconstriction- resulting in poor perfusion of the flap.

Pain score

It is always important if possible to ask the patient if there in pain or discomfort. As poor pain control will impact on the flap. Ensure you encourage patient to take analgesia regularly- if the patient refuses ensure that there aware of the impact this has on the flap.

Urine output

Decreased urine output can be a result of dehydration. Which means the body is trying to maintain cardiac output and the amount of fluid in the intravascular space decreases the body compensates for the decrease by vasoconstriction- shunting the blood flow away from the skin to the internal organs. Resulting in poor perfusion plus risk of blood clots.

Drain output

Excess drainage can indicate active bleeding.

Position

Always look at the post op instruction. This is important to avoid kinking or tension of vessels and also control swelling.

Flap Observations

Postoperative monitoring of free flaps remains an essential component of care in patients undergoing micro surgical reconstructive surgery. Early recognition of vascular problems and prompt surgical intervention improve the chances for flap salvage.

The flap observations are done through a window in the dressing. This should be enlarged if any if any difficulty accessing.

Do Fasciocutaneous flaps have the same Flap observations as a Muscle flap?

No, on the following page we will take a look at both.

Fasciocutaneous flap observations



Colour

Change in colour is one of the first signs of flap compromise. Observe for any changes in colour:

Dusky/mottled/blue/purple means venous insufficiency.

Pale/ White means compromised arterial supply not enough blood is passing through.

Capillary refill

Apply gentle pressure to the flap for 5 seconds then count in seconds the length of time it takes for perfusion:

Prolonged / no refill (more than 4 seconds) can be symptomatic of arterial problems.

Brisk/ no refill (less than 2 seconds) can be symptomatic of venous insufficiency.

Temperature

A free flap that is perfused normally should exhibit a temperature that is comparable to adjacent non flap areas of the patient:

Cold- indicates inadequate blood supply.

Increased warmth- could indicate an abnormal inflammatory response or haematoma.

Skin texture

This assess the adequacy of blood flow:

Flaccid / Empty flap may indicate poor arterial supply.

Firm / Swollen flap may indicate poor venous return or infection.

Doppler sounds

This is performed by placing the hand held Doppler probe on the site of the new anastomosis, which is usually marked intra-operatively with a marker stitch.

Avoid applying pressure which can lead to vascular occlusion.

Unfortunately Doppler can give false positive readings. Do not trust the Doppler if it disagrees with your clinical findings.



Covered with a Skin graft (SSG)

Muscle free flaps do not have a skin paddle so have to be covered with a skin graft.

Skin grafts placed on muscle free flaps cannot be used as a means of monitoring free flaps because they have not yet undergone revascularisation during the period of time that monitoring is performed.

As you can see in this picture the gracilis flap has been covered with a perforated SSG.

Capillary Refill

This assessment applies only to free flaps with a skin paddle and cannot be performed in muscle free flaps that have been skin grafted.

Different colour assessment

Colour assessment is performed differently. In these cases, it is the colour of the muscle that is assessed, which should be red/pink under normal circumstances.

Dusky/mottled/blue/purple means venous insufficiency.

Pale/ White means compromised arterial supply not enough blood is passing through.

Temperature, Texture and Doppler are the same as Fasciocutaneous flap observations.

Flap Observation Chart

First set of observations are to be recorded by the Surgeon with the nurse.



Day Consultant:		Contact details:	
Night Consultant:		Contact Details:	
Patient Name: <i>Label</i>		Date of operation:	
Trust ID Number:		Type of operation:	
		Flap Type & Location:	
		Donor site:	

Consultant instructions:
 Frequency of observations _____ this includes vital signs and fluid balance.

Date																			
Time																			
Assessors initials																			
	Split Skin Graft (SSG)																		
Colour	N-Normal Skin tone																		
	Red -Muscle																		
	White																		
	Pale																		
	Blue																		
Temp to touch	Purple																		
	Warm- Normal																		
	Cold																		
Capillary Refill	Hot																		
	2-3 seconds - Normal																		
	Not needed for Muscle flaps Brisk < 2 seconds																		
	Prolonged > 4 seconds																		
Texture	No refill																		
	Soft- Normal																		
	Flaccid/ Empty																		
Doppler sound present	Firm/ Swollen																		
Light source																			
	Natural																		
	Ward lights																		
Leeches applied	Torch																		
Consultant called																			
	Yes																		
	No																		
	Time informed																		

RED REQUIRES URGENT PLASTICS CONSULTANT INPUT AS THE PATIENT MAY NEED SURGERY

Flap Observation Protocol

Observation	Rationale
Flap type	<p>Flaps are classified depending on the tissue transferred, the blood supply and mode of transfer in relation to donor site.</p> <p>Knowledge of the type of flap– indicate the expected appearance of the flap, where it is in relation to the donor.</p>
Donor site	For cutaneous flaps it is important to know the donor site area skin tone to relate the appearance of the flap.
Post operative instructions	<p>Be aware of positioning requirements: may affect the blood flow.</p> <p>Always locate the anastomosis/ pedicle to avoid compromising blood supply during nursing interventions.</p> <p>Flap observations must be handed over between each shift and a set of baseline observations performed and recorded. Both nurses must initial.</p> <p>Flap changes can be subtle & often occur over time. All changes must be reported promptly.</p>
Colour	<p>A change in colour must be reported immediately. There is a short window for flap salvage - usually within the first 24 hours. Failure to report will have serious consequences for the patient.</p> <p>Muscle flaps– Are covered with a SSG. A normal appearance for a muscle flap is beefy red in colour.</p> <p>Flaps with cutaneous cover –Vary in colour. Always refer to the skin around the donor site.</p> <p>Arterial insufficiency- Range from degrees of pale and white compared with normal skin tone.</p> <p>Venous Congestion– Range from degrees of blue through to purple.</p>
Temperature	<p>Patients must be kept warm to encourage vasodilation and optimal blood flow through the flap.</p> <p>Bair huggers / gamgee are essential.</p> <p>No draughts or fans to be used as these will cool the flap.</p> <p>If the flap feels cool then blood flow could be compromised. Plastics consultant to be called.</p> <p>If the flap feels hot it could indicate an infection/ haematoma. Plastics consultant to be called.</p>
Capillary refill	<p>This assessment applies only to free flaps with a skin paddle and cannot be performed in muscle free flaps that have been skin grafted.</p> <p>Apply gentle pressure to the flap for 5 seconds, then count in seconds the length of time it takes for perfusion.</p> <p>Venous congestion- Brisk/ no refill.</p> <p>Arterial insufficiency– Prolonged/ no refill.</p> <p>Any changes in perfusion call Plastics consultant.</p>
Texture	<p>The flap should usually feel soft to the touch.</p> <p>Arterial insufficiency- Flaccid/ Empty - Plastics consultant to be called.</p> <p>Venous congestion– Firm/ swollen –Plastics consultants to be called.</p>
Doppler	<p>Position of arterial signal will be indicated with a stitch or permanent marker. This should be distal to the anastomosis to reduce the effects of a false positive.</p> <p>Always use Doppler in conjunction with the clinical signs.</p> <p>If there is no arterial Doppler signal Plastics consultant to be called.</p>
Light source	<p>Where possible ensure light source remains constant to maintain parity of the observation.</p> <p>If the light source changes, i.e. day and night, then both light sources used must be included in the bedside handover.</p>