The use of the medicinal leech in venous congested flaps

Introduction
Venous Congestion is a common cause of flap failure. It can be attributed to a number of factors, including inadequate anastomoses, secondary effects of arterial insufficiency, venous spasm and venous occlusion (of which thrombosis is the commonest aetiology).

The hallmarks of venous congestion are: a bluish-purple colour, brisk capillary refill, normal of raised temperature, and the production of dark blood after a pin prick (see figure 2).

If left untreated venous congestion can lead to oedema, capillary and arterial slowing, arterial thrombosis, and flap ischaemia(dab). Flaps demonstrate significantly decreased survival after 3 hours if venous congestion is not relieved and obstruction of venous outflow for 8 hours often results in complete necrosis.

The undisputed treatment of venous congestion is surgical re-exploration of the anastomoses. However, early implementation of leech therapy has been successfully utilised to “buy time” until surgery can be commenced or in instances whereby surgical intervention is deemed unhelpful.

History of leeches

- 130 - 201 AD
  - The concept of humoral disease was proposed by Claudius Galen. He used leeches for blood letting to restore the natural balance of the humors.
- 1567 – 1308 BC
  - The earliest recorded use of the medicinal leech dates back to ancient Egypt, illustrated on a tomb wall in the 18th Dynasty.
- 1932
  - Dutch plastic surgeon, Esser, remarked on the use of the medicinal leech therapy to relieve venous congestion of skin flaps.
- 1960
  - Derganc and Zvadric published “Venous congestion of flaps treated by the application of leeches” in the British Journal of Plastic Surgery.

Technique of leech therapy

- Remove the leech from its container using a gloved hand.
- Clean patients skin thoroughly to remove any traces of operative preparations and saliva. Rinse with plain water.
- Steer the head of the leech to the congested area of skin. If the leech is reluctant to bite, make a small needle prick on the skin to produce a tiny droplet of blood.
- Observe the leech every 5-10 minutes.
- The leech will detach itself after 20 to 60 minutes. Never use force to detach the leeches.
- Leeches are for single use only and should be disposed of in an appropriately labelled container.

Advantages of leech therapy

Efficacy
Medicinal leech therapy decreases venous congestion rapidly, therefore improving flap circulation and allowing neovascularisation to establish (4-10 days).

The leech has two therapeutic effects:
1. a direct small reduction in venous engorgement during feeding (approx 8mls per leech).
2. the continual anticoagulant effects of substances contained in leech saliva which produce a slow blood loss over the following 24-48 hour (see table 1).

Economical and practical
Leech therapy is inexpensive, with each leech costing approximately £9. It is also a readily available treatment with the majority of plastic and reconstructive units having immediate access to a supply in their hospital pharmacy.

Well-tolerated
Leech therapy is widely accepted by patients when effective explanation of the treatment is given.

Risks of leech therapy

Infection
Leeches have no endogenous digestive enzymes and rely on bacterial enzymes to digest the consumed erythrocytes. Aeromonas Hydrophila, a gram negative rod, is part of the normal gut flora of the leech and is responsible for these infections. Rates between 7-20% have been reported. Solution: Prophylactic antibiotics (i.e. Ciprofloxacin) are recommended.

Anaemia
Leech therapy can potentially result in a significant loss of blood. The volume of blood lost is directly proportional to the number of leeches and a 1-2g drop in haemoglobin can be expected following a 5 day course. Solution: Monitor haematocrit levels and other relevant physiological parameters.

Leech “wandering”
Leeches can “wander” or attach to better perfused tissues. Solution: Drape off the area to be decongested, using dampened gauze or transparent dressing.

Contraindications of leech therapy

- Immunosuppressed patients should not undergo leech therapy because of the risk of bacterial sepsis.
- Anaphylaxis and local reaction occurs rarely and therapy should be ceased immediately.
- Special precautions should be taken with children.
- Therapy is potentially contraindicated in patients who are Jehovah’s Witnesses.
- Leech therapy does not aid the salvage of flaps that are in jeopardy secondary to poor arterial supply, infection, excessive tension, seroma or hypotension.

Conclusion
Venous congestion of flaps can occur despite precautions of the most experienced surgeon. Early intervention with leech therapy is of clinical significance in avoiding partial or complete loss of the flap due to necrosis. Whilst surgical exploration of the anastomosis remains the mainstay of flap salvage, the leech has become widely accepted as part of the armamentarium of the plastic surgeon.