

Novel surgical technique as a substitute to painful skin grafts

Skin grafting is a surgical technique which involves the transfer of patients' own skin to the wound for wound coverage. Split-thickness skin graft (SSG), the most common form of skin grafting performed, is usually offered for larger wounds after four to six weeks if they haven't healed (Fig. 1). SSG is an invasive procedure and is done under anaesthetic, which involves shaving the skin away, taking the top layer (the epidermis) and some of the layer underneath (the dermis). This effectively creates another wound, called the donor site, which can be painful, may scar or even fail to heal, especially in the elderly.

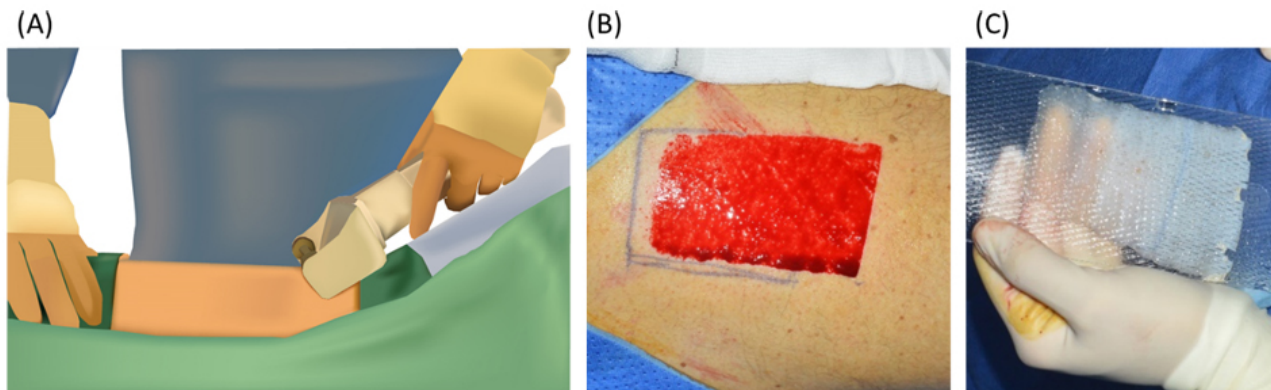


Fig. 1. Split thickness skin grafting. (A) SSG is harvested using an air dermatome which shaves the skin away, creating a donor site wound (B). (C) The harvested skin is then transplanted onto the wound.

Epidermal grafting (EG) is an emerging surgical alternative that is gaining clinical practice. EG is an alternative method of skin grafting that harvests a finer layer of skin, only the epidermis, compared to the traditional SSG. This procedure causes minimal discomfort, does not require anaesthetic, and can be performed in a clinic setting, instead of an operating theatre. A fully automated device is used in our center, the novel CelluTome Epidermal Harvesting System from Acelity™. This device has a suction head the size of a smartphone, which is connected to a control unit. The head is attached to the patient's thigh for half an hour with an elastic strap (Fig. 2). The control unit uses gentle heat (40°C) and vacuum pressure (400-500mmHg) to create tiny visible blisters, the width of a split pea and 2mm high, which is then removed in a controlled manner. A non-adherent dressing is then used to pick up the thin blisters and transferred to the wound. Once the grafts are placed onto the wound, they stimulate the wound bed to regenerate and accelerate the wound edges to grow into the wound. The donor site heals within a week without scarring.

In a pilot study done in our centre at the Royal Free Hospital London involving 35 patients, 7 out of 10 patients achieved complete healing within six weeks, a healing rate which is comparable to

SSG. None of the patients had donor site scarring. In another study that we conducted to evaluate and compare the patient-reported outcome measure between EG and SSG revealed that complete satisfaction with donor site appearance was observed in 100% of the EG cases (50% SSG). Noticeability, adverse problems and overall satisfaction were significantly better in EG cases. Furthermore, our cost evaluation study revealed that the cost per patient for EG was £431 and £1489 for SSG, with an annual saving of £126 960 based on 10 grafts/month.

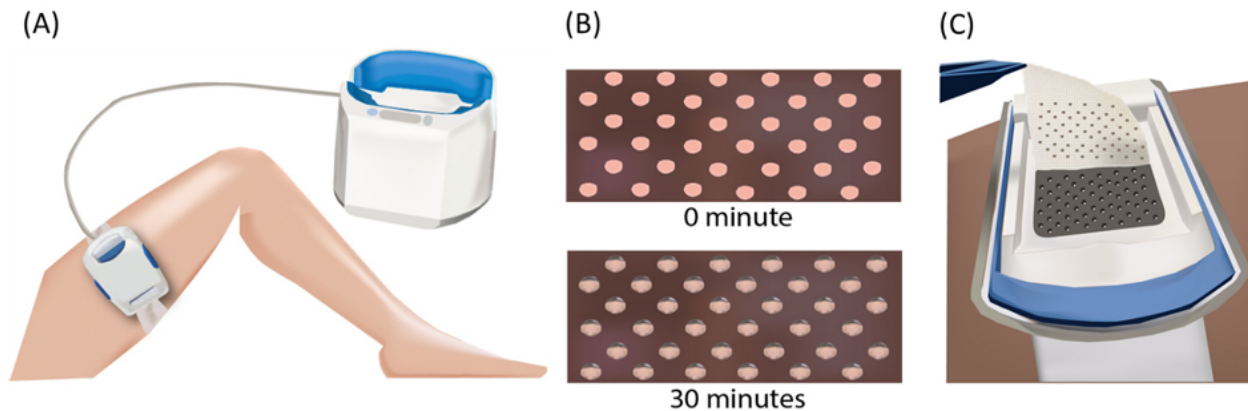


Fig. 2. Epidermal grafting. (A) The CelluTome Epidermal Harvesting System has a pump unit which is connected to a vacuum head and a harvester which is strapped to the patient's thigh. (B) After half an hour, an array of blister is visible in the harvester. (C) The blisters are then excised by an in-built cutter, separating the epidermis from the skin, resulting in a superficial wound which heals without scar. The harvested skin is then transferred onto the wound using a simple dressing.

We are now undertaking a randomised controlled trial to evaluate EG as an alternative to SSG in wound healing (EPIGRAFT Trial). This trial design is pragmatic with scientific evaluation on the wound-healing mechanism by EG and SSG, to promote further understanding and compare the mechanism of healing at the cellular level. It is postulated that EG behaves like bioengineered skin by expressing growth factors that accelerates wound healing and encourages cell migration, whereas SSG is a transplant of several skin layers that integrates to the existing wound bed as a formal skin covering. This research will provide high quality data to guide current best practice for wound care and further our knowledge about the human wound healing process.

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Publication

[Epidermal grafting versus split-thickness skin grafting for wound healing \(EPIGRAFT\): study protocol for a randomised controlled trial.](#)

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