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Conflicts of interest

None.

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Delayed primary closure of extensive wounds using the TopClosure system and topical negative pressure therapy

Dear Editor,

Extensive skin defects can be a challenging problem for a reconstructive surgeon. The primary closure of such defects is hampered by tension and ischemia that develop at the skin edges. In such situations, skin grafting, locoregional, or free flaps are often necessary. We wish to share our experience in achieving primary closure of extensive wounds using the TopClosure system (IVT Medical Limited, Israel) in combination with topical negative pressure therapy. The tissue expansion effect of the TopClosure and the wound contracting ability of negative pressure therapy synergistically facilitates primary closure of such defects.[1,2] This approach is simple, economical, and overcomes the problem of skin edge ischemia.

The TopClosure system resembles a 'lock-release' ratchet device. Each unit comprises a pair of attachment plates placed across the wound which distribute stress evenly around the wound and away from the wound edges. Each pair of plates is connected by an approximation strap which can be advanced to approximate the wound. The device's gear and ratchet mechanism prevents it from slipping when it is tightened.[2] The device should be used only when the wound is clean. To safeguard skin vascularity, the skin edges are undermined minimally. Multiple pairs of attachment plates are placed along the wound edges and each plate is placed 2 cm away from the wound edge. The plates are anchored with Prolene 2/0 sutures and staples. Topical negative pressure is applied over the construct. The duration of each procedure takes an hour, depending on the extent of debridement required. The same procedure is repeated every five to seven days to reposition and approximate the attachment plates.

Between March 2013 and May 2015, 4 patients with extensive soft tissue defects were treated using the TopClosure system and Vacuum Assisted Closure (KCI, USA). The mean age of the patients was 36.5 years (range, 20–55), and the mean duration of treatment was 5.5 weeks (range, 4–8). There were no major complications, such as wound dehiscence or infection. At one year follow up, all healed wounds were stable.

Case 1

A 42-year-old man presented with Group A Streptococcus necrotizing fasciitis of the right lower limb. After debridement, the wound measured 91 × 17 cm with exposed muscles and the knee joint. We applied 8 pairs of TopClosure devices along the wound with a VAC dressing above. With repeated application, wound closure was achieved within two months. The patient completed rehabilitation with full ambulatory function (Figure A, 1a–c).

Case 2

A 55-year-old diabetic man underwent a coronary bypass surgery which was complicated by sternal breakdown. The wound measured 28 × 8 cm with exposed bone and sternal Zipfix straps (DePuySynthes, USA). After debridement, the skin was undermined and 3 TopClosure devices applied to facilitate approximation. VAC placed over the lower aspect of the wound helped reduce the risk of seroma formation. Stable primary closure was achieved at 6 weeks (Figure A, 2a–c).

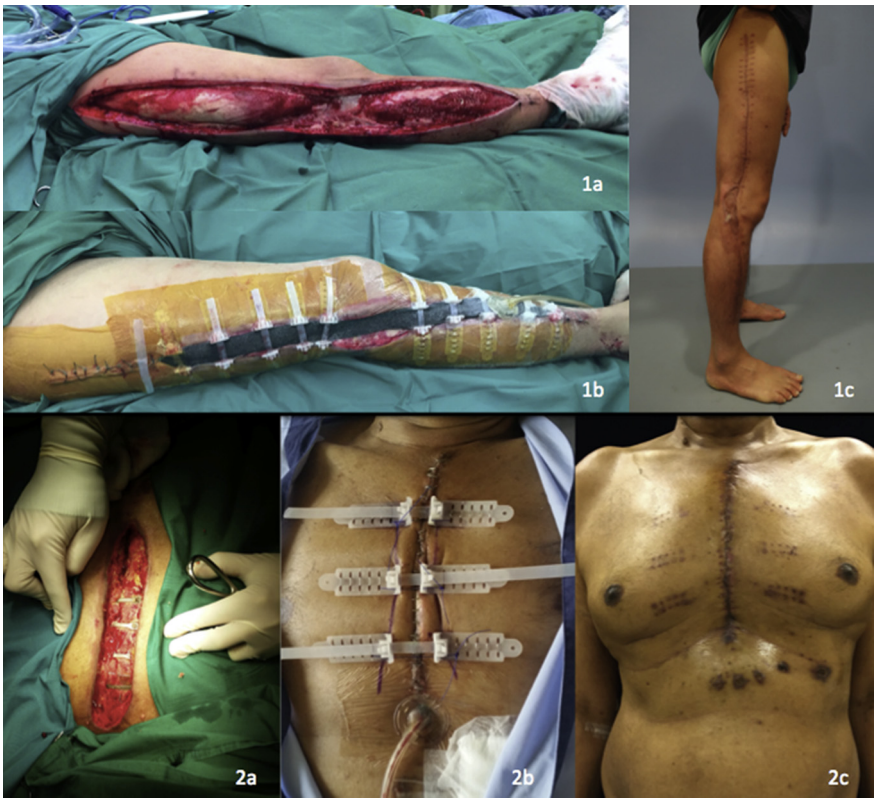

Figure A 1a) Appearance of the wound after radical debridement for necrotizing fasciitis of the right lower limb. 1b) Application of the TopClosure device with VAC; 1c) Appearance of the wound at 6 months. 2a) Sternal wound dehiscence with exposed sternum and cable-ties following coronary bypass surgery; 2b) TopClosure was applied. The lower aspect of the wound was VAC'ed to prevent seroma formation. 2c) Primary closure was achieved.

Case 3

A 29-year-old man presented with a large ventral hernia following multiple surgeries for necrotizing pancreatitis. He previously had an open abdomen and underwent skin grafting of the bowel. TopClosure was applied 2 weeks preoperatively for skin recruitment. 4 weeks later, fascial closure was achieved by components separation and an onlay Prolene mesh. Skin coverage was achieved by wide undermining and layered closure. He had no recurrence of hernia (Figure B, 4a—c).

Case 4

A 20-year-old man with a known metastatic paravertebral synovial sarcoma presented with a massive back tumor after declining initial treatment. The resected tumor encompassed 70% of his back invading into ribs and pleura. Temporary skin grafts were applied because of massive bleeding. On re-look surgery, TopClosure and VAC were applied in the usual fashion. Three weeks later, a latissimus dorsi muscle flap was mobilized to cover the posterior ribs. Stable skin coverage was accomplished with delayed primary closure and he was able to ambulate independently for the first time after being bed-bound for 5 years.

Skin defects as a result of trauma, infection, or neoplasm can be too extensive for direct closure. The TopClosure system harnesses the physiological viscoelastic properties of skin to achieve primary closure by progressive skin stretching and tissue expansion.[1—3] Combining it with topical negative pressure therapy helps to reinforce the construct, distribute tension, and promote granulation tissue formation.[4,5] To harness this effect, we manually draw the surrounding skin toward the centre of the defect before applying the VAC drape. The suction generated by VAC also helps to off-load tension over the plates, reducing the risk of plate pull-out. The indication for this method includes skin defects which cannot be closed primarily without the aid of skin grafting, tissue expansion, or flap surgery.

This device can be initiated preoperatively to achieve a gradual external skin expansion. However with prolonged usage, the staples can tear through at their anchor points. We overcame this problem by alternating staple sites along the plate. We do not recommend the use of TopClosure on fibrotic and scarred surgical sites, dirty wounds, or areas with unhealthy skin edges. The plates should also not be over-tightened to avoid compromise of the cutaneous blood supply.

One problem is that the sharp edges of the plates can perforate the drape and cause a leak in the VAC system. Dr Topaz overcame this problem by lining the device with gauze before applying the VAC drape. Scarring and pigmentation at the staple points may be a problem in Asian patients, and we advocate early scar treatment over the

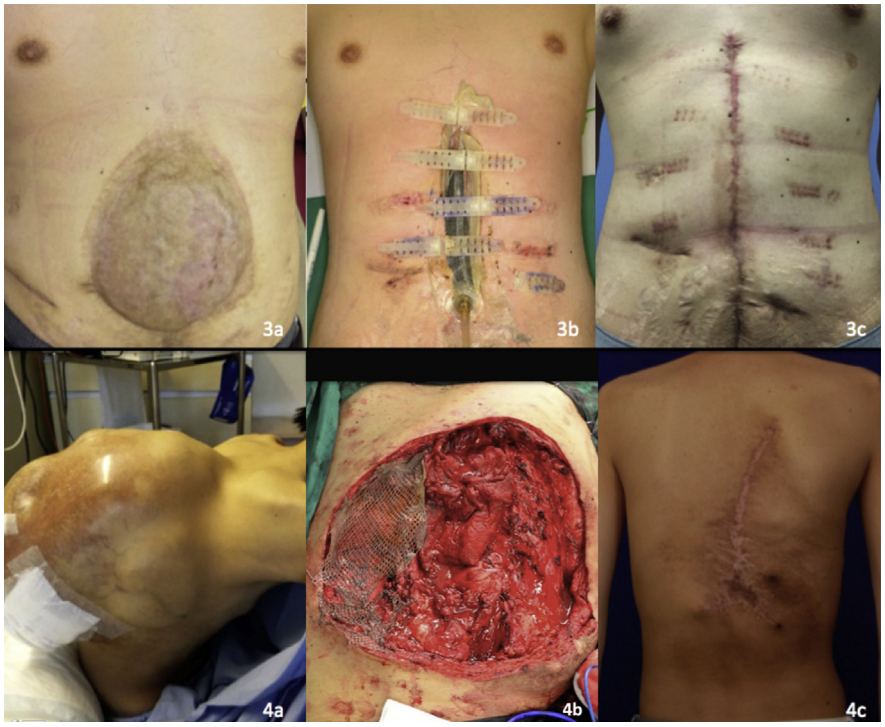

Figure B 3a) A large abdominal wall defect with skin-grafted bowel demonstrating visible peristalsis; 3b) Application of TopClosure and VAC for skin recruitment 4 weeks prior to definitive closure; 3c) Delayed primary closure of the abdomen was achieved with components separation and mesh repair. 4a) Massive paravertebral sarcoma in a 20-year-old male; 4b) The resultant skin defect measuring 40 × 30 cm. Skin closure was facilitated by TopClosure and VAC; 4c) Stable wound closure at 8 months.

affected areas. However, this side effect is mitigated by the accomplishment of primary closure without the complications of wound dehiscence and ischemia.

Conflict of interest

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Audit of venous thromboembolism in DIEP free flap breast reconstruction

Dear Sir,

Breast reconstruction using Deep Inferior Epigastric Perforator (DIEP) flap has become a routine and reliable procedure