

Purpose

Understanding and avoiding postoperative peri-incisional ischemia allows surgeons to reduce risk of wound dehiscence and improve outcomes. Dehiscence after incision or wound closure can occur due to incision or flap placement, high tension closure or from suture breakage¹. Skin edge perfusion is vital for successful healing to occur. Traditional closure tools can adversely affect skin edge perfusion, especially during postoperative swelling. As tissue volume increases with edema, more tension results at the tissue/suture interface. This can cause the closure device to become a tourniquet in effect, with resulting ischemia, necrosis, and sequelae such as wound dehiscence. Alternative closure devices that disperse suture tension away from the skin edge can lessen the risk of postoperative peri-incisional ischemia.

Methods

A simple adhesive device* can be applied to either side of a wound or Figure 1C Figure 1D incision during closure. It acts as a load transferring skin anchor that works Figure 1A shows the medial ankle incision 3 weeks post-op. Figure 1B is the in combination with nonabsorbable suture. Surgeons can apply high tension medial ankle incision 11 weeks post-op. Healing of the medial incision was without skin tearing due to the device's load transferring design that shifts achieved at 3 weeks when the simple adhesive devices and nylon sutures were suture tension away from the skin edge, preserving skin edge blood flow. A removed. Figure 1C is the lateral ankle incision 3 weeks post op. There was layered suture is placed through the device and then the tissue can withstand closure without tension and the incision still developed peri-incisional ischemia. significant suture force without suture "cheese wiring" or tearing through **Figure 1D** is the lateral ankle incision finally healed at 11 weeks. the skin as the suture is tied². Once tied the force used to close the wound is now dispersed along the entire length of the 12 cm device, dispersing the suture tension away from the skin edge, reducing the risk of peri-incisional ischemia and necrosis. Local stress in the skin around the suture is also reduced by the bonding of simple adhesive device to the skin². Case 1: 75 year-old female with multiple comorbidities such as DM type 2, RA, SLE, hypothyroidism and CKD stage 3, sustained a closed bimalleolar ankle fracture and metatarsal fracture from a low energy fall. The lateral incision underwent layered closure without tension with 3-0 nylon for skin closure due to no internal fixation necessary. The medial ankle underwent plate and screw fixation. Two simple adhesive devices were utilized with 2-0 nylon suture due to the inability to perform layered closure. Case 2: 36 year-old with DM type 2, peripheral neuropathy and obesity underwent midfoot Charcot reconstruction. The medial extensile incision was closed utilizing 2 pairs of simple adhesive devices with 2-0 nylon at areas of most tension. The remaining incision did not have tension upon skin closure with 3-0 Figure 2C Figure 2A Figure 2B nylon.

Understanding and Avoiding Postoperative Peri-Incisional Skin Necrosis

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Results





Figure 2A shows the medial extensile incision during surgery. Layered closure was acheived without tension at the 1st metatarsophalangeal joint (MTPJ). Figure 2B is 3 weeks post op. The smaller light blue arrows show where the simple adhesive device was sutured at areas of high tension. The larger darker blue arrow points to the 1st MTPJ where periincisional necrosis occured and no simple adhesive device was utilized. Figure 2C shows the 1st MTPJ wound healed after 4 months.

Successful healing after foot and ankle surgery can be challenging due to problems with vascular inflow and outflow, swelling and weight-bearing requirements. Fragile and compromised skin can also post risks. Postoperative edema alone can increase tension on the skin beyond its fracture point³. Traditional wound closure tools can create ischemia when postoperative swelling or motion applies additional stress at the suture-tissue interface. A load transferring skin anchor can mitigate that risk by protecting skin edge perfusion, especially in high risk patients with fragile skin, diabetes, peripheral vascular disease or any combination thereof.

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Conclusions

References

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