

Figure 1. Schematic illustration of the suture path augmented with a soft silicone tube, traversing through multiple soft tissue layers.

ion. By tensioning the mattress suture, the pressure is exerted through the soft silicone drainage far from the wound, bringing the edges in close approximation and removing tension from the wound edges. After tensioning the mattress sutures, the skin is closed with regular stitches. The mattress sutures are removed seven days postoperatively (Fig. 1, 2).

Three patients (two males, one female) with prolonged serosanguineous discharge from the surgical incision after lumbar spine surgery treated with the above described additional multilayer mattress stitches are described in further detail (Table 1). The multilayer mattress stitches were removed after 7 days in all cases. Even if subjectively considered unlikely by the wound revision time, none of the patients required additional interventions. A postoperative follow-up 4-6 weeks after the index procedure revealed unremarkable wound healing in all cases.

Discussion

Wound complications account for approximately 20% of early postoperative adverse events in spine surgery^{1,5,6}. Continued discharge from the surgical incision results in a prolonged hospital stay and increased health care costs³. The here described, additional multilayer mattress stitch provides simultaneous closure for both superficial and deep tissue layers resulting in a synergistic effect of reducing dead space and tension-free wound edge approximation by exerting pressure far from the wound margins.

Retraction of the wound edges is caused by loss of tissue after debridement and relaxation of collagen/elastin fibers resulting in increased force required to achieve direct approximation⁸. Dermatotractor, exerted by the placed sutures, uses the skin's viscoelastic properties to induce mechanical creep and stretch the skin by straightening and

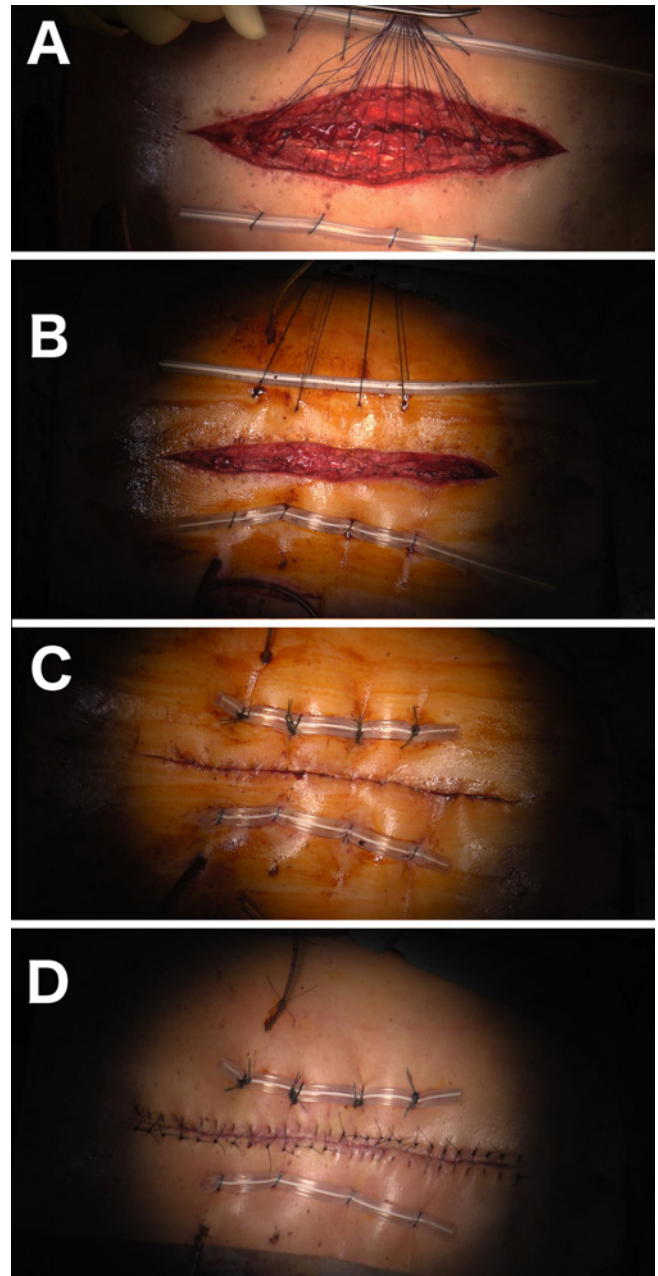


Figure 2. Intraoperative documentation of the additional multilayer mattress stitch; A: before tensioning of the fascia; B: before subcutaneous suture; C: after tensioning of subcutaneous sutures; D: after skin closure.

elongating collagen fibers along the vector of force⁹. The force applied to the surrounding tissue by tensioning the suture is redistributed laterally along the wound's length via the soft silicone insert to minimize the risk of suture pull-through and ischemic injury⁷. Maintaining perfusion and oxygenation to the wound margins by reducing local pressure and avoiding digging-in of the suture loop into the skin is paramount to facilitate wound healing¹⁰. Similar techniques have successfully been applied in other fields of surgery, mainly as an adjunct to reduce large wound surface areas in chronic wound therapy^{7,11}. Variations of traction assisted wound closure techniques with and without additional negative pressure wound therapy (NPWT) are well-described

Table 1. Case Summary.

	Case 1	Case 2	Case 3
Age (years)	72	77	60
Gender	male	female	male
BMI (kg/m ²)	36.42	32.79	27.17
Intervention	Spondylodesis L1-L3, TLIF L2/3	Spondylodesis L2-S2-Ala-Ilium	Decompressive Laminotomy L4/5
Complication Grade ¹⁾	ISB0	IISB0	ISB0
POD of Revision (days)	9	5	10
Hospital stay (days)	14	46	21
Microbiology	negative	<i>P. mirabilis</i> , <i>E. coli</i>	negative
Risk factors	DM Type II, Obesity Grade II	Chronic kidney failure KDIGO 3b, Obesity Grade I, Malnutrition (NRS 3)	Ischemic heart failure
ASA-Score	III	III	III
Revision case	No	Yes	Yes
Follow-up (weeks)	4	38	6

ASA: American Society of Anesthesiology; BMI: Body Mass Index; KDIGO: Kidney Disease: Improving Global Outcome; NRS: Nutrition Risk Score; TLIF: Transforaminal Lumbar Interbody Fusion

treatment options in complex abdominal wall and limb fasciotomy defects¹²⁻¹⁴. While multiple reports describe the results of NPWT after lumbar spine surgery, similar reports using dermatotraction with or without NPWT for the closure of complicated lumbar wounds after spine surgery are missing¹⁵⁻¹⁹. Potential advantages of dermatotraction include the possibility to change dressings outside the operating room, thereby lowering health care costs and avoiding the necessity for repeated anesthesia.

This report aims to communicate the excellent experience using dermatotraction using multilayered mattress stitches to treat complicated spinal wounds, otherwise frequently requiring multiple surgical interventions. Larger case series with control groups are warranted to determine whether dermatotraction with bridging retention sutures provide an advantage compared to traditional NPWT for complicated wounds in lumbar spine surgery.

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Author Contributions: DB: authored the manuscript, acquired the data

CL: critically revised the manuscript and created the figures and artwork

MF: acquired the cases, critically revised the manuscript, and approved the final version

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