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# Defect closure with “8-shaped crisscross tensile suture” technique



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## ABSTRACT

**Background:** Sutures and suturing techniques compose the basis of the surgery. Although many surgical methods such as the skin grafts or flaps has been described for the closure of large defects, proper primary suturing may sometimes yield very successful results and decrease the need of complicated procedures. In this article, a new combined skin-subcutaneous tissue suturing technique called as “8-shaped crisscross tensile suture (8CTS)” designed for the closure of large skin defects is presented.

**Patients and methods:** One hundred forty-nine patients with an age distribution between 14 and 65 y were operated for large skin defects by using the 8CTS technique. The most common etiology of the defects was free flap donor sites, and the most common defect localization was the anterolateral thigh region. The average defect width on the axis of primary closure was calculated as 14.6 cm. The 8CTS technique is a combination of both skin and subcutaneous layers suturation and may even involve deeper layers suturation according to the depth of the defect.

**Results:** Eight complications including wound dehiscence, early recurrence of pilonidal sinus disease, seroma formation, skin-edge necrosis, and incisional hernia were observed. The wounds of 141 patients were treated successfully.

**Conclusions:** The 8CTS technique is a useful method for the closure of large defects eliminating the need of more complex procedures and providing acceptable cosmetic results while supporting both skin and subcutaneous tissue in one suture.

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## 1. Introduction

Various skin defects located on any part of the body can be treated with many different surgical approaches such as

primary closure, skin grafting, local or distant flaps, or even complex procedures like free tissue transfers [1]. Primary closure is the preferred treatment of any kind of wounds in routine surgical practice and is also the easiest solution both

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for the surgeon and the patient as it is the first step of reconstructive ladder [1,2]. However, large wounds especially free flap donor areas, defects occurring after large tumor resections, or removal of wide pilonidal sinus disease are generally unsuitable for primary closure and split-thickness skin grafting, which have several disadvantages such as the need of a new donor area and poor cosmetic results, is usually required [3,4]. Large defects may also be repaired by gradual skin traction systems, but these methods usually increase the hospitalization period of the patient and can only be performed in selected patients [5–7]. The 8-shaped crisscross tensile suture (8CTS) technique presented in this article is a combined skin-subcutaneous tissue suturation method providing both skin and subcutaneous tissue support at one suture and may be used for the closure of large defects eliminating the need of additional methods or complex reconstruction techniques.

## 2. Patients and methods

One hundred forty-nine patients with an age range of 14 to 65 y (mean age: 36.4 y) were treated because of large skin defects using the 8CTS method between May 2005 and June 2013. One hundred eleven patients were male, whereas the remaining 38 were female. The most common cause of the defects was flap donor sites followed by wide mastectomy defects and pilonidal sinus surgery. One hundred forty of 149 defects were extending to the deep fascia. The mean defect width on the axis of primary closure was calculated as 12.8 cm in a range of 3.7–23.4 cm. Thirty-four of 149 patients (22.8%) had comorbidities; diabetes and hypertension were the most commonly observed comorbid diseases followed by hypercholesterolemia, chronic lung disease, and chronic renal failure. Furthermore, 16 of our 149 patients were obese. Table summarizes important details about the defects treated with 8CTS technique.

## 2.1. Surgical technique

Polypropylene suture (size, 1-0, 2-0, and 3-0) with sharp needle depending on the size and location of the defect is used for the 8CTS method. Before beginning to the suturation, skin undermining was performed. The planned undermining was half of the width of the defect on each side and during the undermining; skin perforators were carefully protected. In the first step, the needle is passed through the skin of side A to the subdermal plane and then through the same plane at the side B in the direction of subcutaneous tissue. In the second step, which is the second half of the figure “8,” the needle is passed through subcutaneous tissue of side A and turned back to the subdermal plane of side B passing through the skin to tie the knot (Fig. 1A). If it is needed, it can be finished in mattress or half-buried mattress fashion. Deeper defects such as the pilonidal sinus defects require more than one 8CTS, and in this situation, the first 8CTS is extended with a second vertically directed 8CTS resembling a braid (Fig. 1B). In all cases with 10 cm or wider defects, the skin was supported with greasy gauze pads that were removed at the third postoperative day to reduce the tension on the skin (*The Video of the technique is available as supplemental file*).

## 3. Results

In all patients, surgical drains were removed in the first three postoperative days, and sutures were removed at the postoperative third week (Fig. 2, Fig. 3 and Fig. 4). Eight remarkable complications were encountered among 149 patients (Table). In one patient treated for anterolateral thigh flap donor site, wound dehiscence occurred because of early suture removal performed in another center. This patient was treated with the same technique after wound debridement, and sutures were removed on the third postoperative week uneventfully. In one patient operated because of a large pilonidal sinus defect, early recurrence of the disease was detected, and

**Table – Important details about the defects closed with 8CTS technique.**

Cause of the defect	Number of patients	Mean (range) width (cm) <sup>*</sup>	Cases extending to deep fascia	Complications
ALT flap donor site	37	12.4 (7–16.3)	37	Wound dehiscence (n = 1) <sup>†</sup>
Venous flap donor site <sup>‡</sup>	14	5.4 (3.7–6.2)	14	—
Secondary to pilonidal cyst and sinus surgery <sup>§</sup>	23	14.2 (11.3–19.4)	18	Early recurrence of the lesion (n = 1) <sup>†</sup>
Wide mastectomy defects	26	19.9 (17.2–23.4)	26	Seroma formation with self-relief (n = 2)
TFL flap donor site	18	11.3 (9–14.2)	18	—
Traumatic skin avulsion (immediate repair after debridement)	16 <sup>  </sup>	8.8 (6.3–12.1)	12	Skin-edge necrosis <sup>†</sup> (n = 2)
Anterior abdominal wall exploratis laparotomy defect	15	12.4 (8.2–15.6)	15	Incisional hernia (n = 2)
All patients treated using 8CTS technique	149	12.8 (3.7–23.4)	140	Previously mentioned complications (n = 8)

ALT = anterolateral thigh flap; TFL = tensor fascia lata.

<sup>\*</sup>This width means the dimension vertical to the axis of the wound and parallel to repair axis.

<sup>†</sup>All these complicated patients were treated again by using 8CTS technique without any additional complications.

<sup>‡</sup>All the venous flap donor sites were at the volar aspect of upper extremity.

<sup>§</sup>All the pilonidal cyst or sinus operations were performed by plastic surgeons.

<sup>||</sup>Two cases of torso, 10 cases of lower extremity, and four cases of upper extremity.

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