

## The Significance of Closed Suction Drains With Tissue Expander.

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### Abstract:

**Objective:** The study was done to evaluate the effect of closed suction drains on local wound complications and the progression of the expansion.

**Patients and methods:** The study includes 32 patients were selected from outpatient clinic / Azadi teaching hospital / Kirkuk; divided to 2 groups, 20 patients with suction drain (redivac drain) and 12 patients without drain; between March 2007- July 2011. The surgeries done in plastic and reconstructive surgery department by one surgeon.

**Results:** The median range of follow up was 2-4 months. post operative complications for drained group (20 patients) were seroma and hematoma 0% while infection occur in 1 patient (5%) only; on the other hand, complications for the undrained group (12 patients) include seroma and or hematoma formation in 4 patients (33.3%), infection in 4 patients (33.3%) while implant extrusion occur in 3 patients (25%).

**Conclusions:** The use of closed suction drains with introduction of tissue expander is advantageous; it significantly decrease the risk of complications and re operation rate.

**Key words:** Drain, Seroma, Hematoma, Tissue expander.

### Introduction:

Tissue expansion is a mechanical process that increases the surface area of local tissue available for reconstructive procedures<sup>(1)</sup>.

Living tissue responds to the application of mechanical force, progressive expansion or traction, increases surface area of overlying or surrounding tissues by inducing an increase in mitosis and recruiting adjoining tissues<sup>(2)</sup>.

Tissue expansion has developed as a routine procedure in plastic surgery in the past three decades. In 1956, Neumann was the first to recognize the potential of tissue expansion for reconstructive surgery. He implanted a balloon beneath the temporal region for reconstruction of an absent ear<sup>(3)</sup>. Subsequently the use of tissue expansion has been popularized among plastic surgeons and has become the treatment of choice for many congenital

and acquired defects in children and adult<sup>(4,5)</sup>.

Following the insertion of tissue expander, the formation of seroma and hematoma can be associated with infection necessitating the removal of the expander<sup>(6)</sup>; redivac drains may prevent such complications<sup>(7)</sup>. Suction drains were well known method that decrease the risk of seroma and hematoma<sup>(8)</sup> that is a good media for the growth of microorganisms.

The current study aims at comparing two groups of patients undergoing tissue expander surgery and highlights the importance of suction drains.

### Patients and methods:

This study was done from March 2007- July 2011. The study included 32 patients were selected from outpatient clinic/ Azadi teaching hospital/ Kirkuk, at the start, in 12 patients no closed suction drains (redivac) were used,

while in the last 20 patients closed suction drains used.

The surgical technique includes, introduction of closed suction drain tube into the created pocket (fitting the tissue expander), exteriorizing the tube of the drain from the site distant to the wound of expander introduction (just opposite to the wound) by about 2-3 cm from the edge of the created pocket, fixing the tube drain, connecting it to a suction bottle, then introducing the tissue expander (nagor company) of variable sizes and shapes according to the surgical indication, exteriorizing the port of inflation from the site close to the drain tube. The expander filled with 3-6 cc of normal saline, keeping the sutured wound with low or no tension, on the other hand, obliterating the created space as much as possible. The drainage tube was removed after 15 -18 days, even if there is minimal drainage, that is to allow fibrosis around the tube, with an open port to peri expander region, keeping in mind that the expansion may be done 3-5 times while the drain is in place.

In the beginning of the study, no drain were inserted with the introduction of tissue expander, while in the last 20 patients drains were used as a routine procedure.

### **Results:**

The distribution of patients according to the using of drain with tissue expander was shown in table (1).

The tissue expander in all patients used for reconstructive purposes, their age was ranging between 10 years to 34 years, the males represents 19 of cases while the females were 13 cases; as shown in Table (2).

The indications for surgery was post burn scars in 25 cases , post traumatic scars in 5 cases and only 2 cases with post trauma contracture; as shown in Table (3).

The median range of follow up was (2-4) months, mean was 3 months, i.e. the time of definitive surgery (removal of expander) and final reconstruction. Post operative complications for both groups are given in table (4).

Clinically detectable seroma and hematoma was 0% in the group of the patients with the suction drain, while occurred in 33.3% cases in the group of the patients that were without suction drain.

Infection rate was 33.3% in the group of the patients without suction drain, while the rate decreased significantly with the introduction of the suction drain to only 5%.

Extrusion of the expander was found in 25% of the patients without drain in the peri expander area, while it was 0% in those patients with the suction drain introduced. The extrusion was either from the surgical wound site or from the area that is most dependent.

**Table (1):** The use of drains and tissue expansion

	No. of patients	%
Patients with drain	20	62.5%
Patients without drain	12	37.5%

**Table (2):** Gender of the patients and tissue expansion

Sex	No. of patients	%
Male	19	59.3
Female	13	40.6

**Table (3):** Indications for tissue expansion

Indication for surgery	No. of patients	%
Post burn scar	25	78.1%
Post trauma scar	5	15.6%
Post trauma contracture	2	6.2%

**Table (4):** Complications of tissue expansion

	Seroma, hematoma	Infection	Extrusion
Drain used	0%	5%	0%
Drain not used	33.3%	33.3%	25%

### **Discussion:**

The selection of the patients were done on the random base, so neither the age and the sex nor the size and the site of the expander have an influence on the progression of the expansion or on the complications, keeping in mind all the surgeries done by one surgeon, so the variables that have an impact on the fate of the expansion were not present.

In a study done by lacy,G.M. at 1996, showed that female cases were representing 65% of total number compared to 35% male patients, he related that to self caring and seeking for perfection that are stronger among females than males<sup>(9)</sup>, however , about 59.3% of our studied cases were male patients, this disparity may demonstrate other factors that affects sex distribution as working environment that is more hazardous for males than that for

females, on the other hand, scar stigma on the exposed sites of the body affect employment of the patient and there chance to get a job.

Majority of patients included in this study were have post burn scars 78.1 % , this partly explained by the main drainage of the burn unit to our clinic in Kirkuk province, and also the involved area with burn was usually wide and deforming, especially if it affects the head and neck regions.

Complications for the group of patients that have closed suction drains 0% (hematoma, seroma, extrusion), 5% infection, these were directly related to the negative pressure drainage system (redivac) that minimize the dead space to a maximum possible limit that in turn decreases risk of both hematoma and seroma levels, these findings supported by Somers R. G., et al. findings who demonstrated that closed suction

drainage after axillary surgery was advantageous. This group performed a randomized trial of the use of the drains in 227 surgical operation and concluded that both the incidence and degree of seroma formation were minimized with suction drainage<sup>(10)</sup>.

Complications for the group of patients who have no closed drains introduced, were 33.3 % (hematoma, seroma, infection) , 25% extrusion, findings that may be explained by the collection of fluid in the created space, collection of fluid between the folds of the implant itself and between the angles of the implant with the angles of the created pocket, although the pocket were dissected to fit more or less the expander size, these collections will lead to colonization then subsequent infection and probable extrusion of the implant.

Jeffery S.S., et al. evaluated patients with axillary lumpectomy without drains. In 92% of patients, post operative seroma drainage with an ultra sound guide was needed; and only 42% of those collections required aspiration<sup>(7)</sup>.

The use of closed suction drain is time honored practice in the management of post operative surgical wounds, the intent of which is to reduce the dead space and remove the blood and seroma fluid<sup>(11, 12)</sup>. Sequestered, serosanguinous fluid provides an excellent culture media for micro organisms to grow, then high susceptibility for infection. Thus, in theory by eliminating the formation of such a fluid collection, the likely hood of wound healing problems and infectious complications are reduced<sup>(7, 13, 14)</sup>. While this concept of removing sequestered fluid with drains is appealing, any theoretical advantage

may in fact be offset by the possibility that the drain can allow the introduction of bacteria into the wound. Caries E.J., et al. and Nora P.F., et al, demonstrated experimentally that retrograde bacterial migration occurs in the presence of surgical catheter<sup>(4, 12)</sup>. Raves J.J., et al., further demonstrated that bacterial contamination of surgical wound occurs despite the use of closed suction drainage systems. Thus by providing a rout of entry for bacteria into a clean wound, drains may actually potentiate the rate of post operative infections<sup>(15)</sup>.

Currently, there are no standardized recommendations addressing the use of drains following tissue expander introduction. In fact, data to support the perceived benefits of suction drainage of surgical wounds in general are inconsistent<sup>(8, 10, 15)</sup>. Numerous studies in various surgical situations have implied that drainage of operative sites ,while in some cases reducing the incidence and volume of seroma / hematomas, does not appear to affect either the rate of development of post operative complications or subsequent wound healing<sup>(16)</sup>.

A randomized controlled trial compared the rate and volume of seroma formation after axillary surgery with and without use of suction drains, there was no difference in incidence of seroma formation between patients who did or did not have a drain inserted after axillary surgery. Patients without drains were however; more likely to have a larger volume seroma requiring more aspirations, despite this, there was tendency for undrained patients to have a fewer complications when compared with patients with drains<sup>(10, 16)</sup>.

Young – Hoo Kim, et al. through a prospective study of 48 patients (96 hips), who had undergone primary simultaneous bilateral total hip arthroplasty, was evaluated to assess the effect of postoperative suction drainage on wound healing and infection, they recommend the routine use of suction drains for wounds after primary total hip arthroplasty<sup>[17]</sup>. although there are different variables between the 2 studies, but the both ideas were based on the same principles.

Until now there are no studies documenting the efficacy of closed suction drainage when applied with tissue expander. As is demonstrated by this study, drains appear to prevent the formation of clinically detectable seroma / hematoma. Thus if drains used, additional risks of local wound complications are decreased, conversely, when drains are omitted, the risks of local wound complications are increased.

### **Conclusions:**

The use of closed suction drains after tissue expander introduction, does affect the rate of perioperative complications that include seroma and hematoma formation and subsequent infection. Current finding suggests that if closed suction drains were used with introduction of tissue expander, the risk of local wound complications minimized by controlling the seroma, hematoma and subsequent infection rates.

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