

Comparative study of different incision types in inguinal lymphadenectomy: retrospective study**Mohammad Taher^{a*}, Rasha M. Allam^b, Mohamed Shalaby^a, Ibrahim Abdelrahman^a**^aSurgical Oncology Department, National Cancer Institute, Cairo University, Cairo, Egypt.^bBiostatistics & Cancer Epidemiology Department, National Cancer Institute, Cairo University, Cairo, Egypt.**Abstract****Background:** Inguinal lymphadenectomy has always been associated with a high complication rate, mostly related to wound healing.**Objectives:** We aimed at evaluating the skin excision vertical incision in lowering wound complication rate following inguinal lymphadenectomy.**Patients and Methods:** Patients underwent inguinal lymphadenectomy for malignant nodal metastasis at the National Cancer Institute, Cairo University, Egypt in the period from January 2017 to December 2020. According to the incision type, we divided them into three groups: Group 1: vertical with vertical skin ellipse (~4cm) excision. Group 2: vertical S-shaped without skin excision. Group 3: transverse incision. We compared the short-term outcome among these groups.**Results:** Seventy-eight patients included, 27 (34.6%) G1, 27 (34.6% G2), and 24 (30.8%) G3. Complications occurred in a total of 20 cases (25.6%). Its rate was highest in G3 (37.5% of cases) and least in G1 (14.8%). Flap necrosis was a common serious complication. It least occurred in the G1 Group and most in the G3 Group. No statistical difference was noticed regarding the median operation time, postoperative hospital stay, and median duration before drain removal. Capsular rupture did not occur in G1 patients, occurred only in one case of G2 (3.7%) and 2 cases of G3 (8.3%). Despite being statistically insignificant it is very significant oncologically.**Conclusions:** Vertical elliptical skin wedge excision in inguinal lymphadenectomy provides better surgical field exposure. It avoids direct handling of the tumor; thus is more safe oncologically. It has the least flap necrosis rate among other incision types.**Keywords:** Inguinal lymphadenectomy; Skin excision; Lymphedema; Cutaneous malignancy; Soft tissue sarcoma.**DOI: 10.21608/svuijm.2023.207207.1575*****Correspondence:** mohammed.taher@nci.cu.edu.eg**Received:** 1 May, 2023.**Revised:** 10 May, 2023.**Accepted:** 21 May, 2023.**Published:** 21 May, 2023**Cite this article as:** Mohammad Taher^a, Rasha M. Allam, Mohamed Shalaby, Ibrahim Abdelrahman. (2023). Comparative study of different incision types in inguinal lymphadenectomy: retrospective study. *SVU-International Journal of Medical Sciences*. Vol.6, Issue 2, pp: 291-300.

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Introduction

Inguinal lymphadenectomy has always been associated with a high complication rate, mostly related to wound healing (**Jeanne-Julien et al., 2023; Nabavizadeh et al., 2023; Bertheuil et al., 2015; Vordermark et al., 1985**). This high complication rate significantly impacts the quality of life and theoretically restricts the application of recommended lymphadenectomy for oncologic indications (**Nabavizadeh et al., 2023**).

Thus, many different approaches, and sometimes their combination, have been always sought to lessen the morbidity of inguinal lymphadenectomy, but no single one proved to be ideal (**Nabavizadeh et al., 2023**).

The ideal incision for inguinal lymphadenectomy would permit adequate exposure while minimizing wound-related complications (**Kean et al., 2006**). Excision of a skin ellipse (~4cm width) was found in many series to lower wound complications' rate. It also allows better exposure and tumor control, notably bulky disease (**Somé et al., 2020; Bertheuil et al., 2015; Kean et al., 2006; Vordermark et al., 1985**).

We aimed to describe our work and to compare the early postoperative outcome of three incision types for patients who had inguinal lymphadenectomy for nodal metastatic

cutaneous malignancy or soft tissue sarcoma of the lower limb.

Patients and Methods

Study design: A retrospective study.

Patients: All patients underwent inguinal lymphadenectomy (synchronous with the primary tumor or metachronous) for nodal metastatic cutaneous malignancy or soft tissue sarcoma of the lower limb at the National Cancer Institute – Cairo University, Egypt in the period from first. January 2017 to thirty-first. December 2020. We excluded those who had previous incisions or irradiation involving the area of the femoral triangle to not interfere with our incisions.

Methods: After obtaining the Institutional Review Board (IRB) approval of our institute (IRB no # 2211-510-015), we collected the files of the included patients in the study. The surgical procedure data, the postoperative course, and the pathological results were retrieved.

We found that three types of incisions were used, and accordingly, we divided the patients into three groups: Group 1: vertical with vertical skin ellipse (~4cm) excision, (**Figs. 1 & 2**). Group 2: vertical S-shaped without skin excision. Group 3: transverse incision (2-3 fingerbreadth below the inguinal ligament) (**Fig.3**). Other procedure steps were identical, and skin closure was done primarily in all cases.

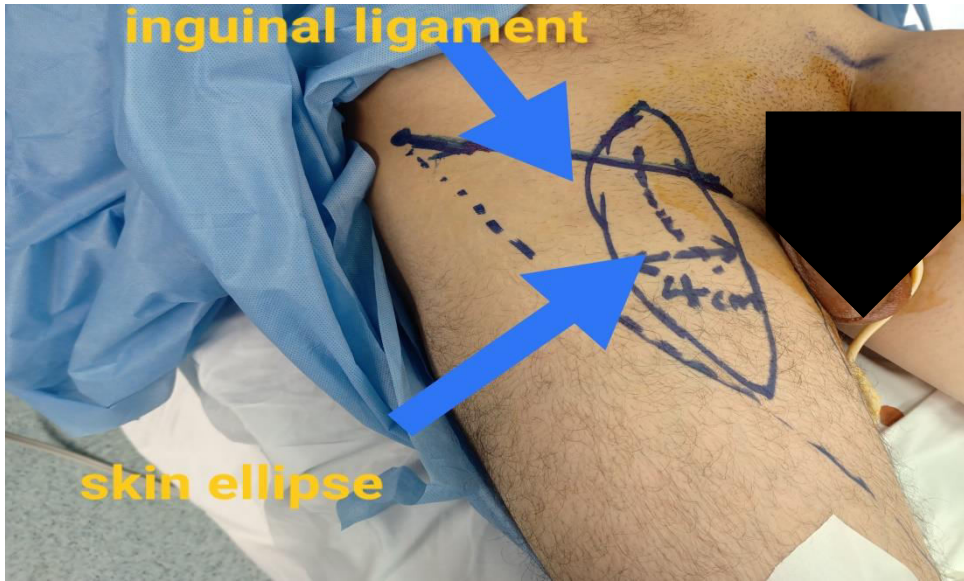


Fig.1. Vertical wedge skin excision



Fig.2. The specimen with the overlying skin wedge



Fig.3. The other two incision types: A: Vertical S-shaped incision without skin excision, B: Transverse incision

We assessed and compared the short-term outcome: early complications (within two months), operative time, postoperative hospital stay, drain removal, resection margins, capsular rupture, total number of lymph nodes retrieved, and the ratio of positive lymph nodes yielded.

Statistical analysis

Data were analyzed using IBM SPSS advanced statistics (Statistical Package for Social Sciences), version 24 (SPSS Inc., Chicago, IL). Numerical data were described as median and range. Chi-square (Fisher's exact) test was used to examine the relation between qualitative variables, as appropriate. P-

value ≤ 0.05 was considered significant, and all tests were two-tailed.

Results

The study included 78 patients, of which 27 (34.6%) had vertical incision with elliptical skin excision (Group 1, G1), 27 (34.6%) had vertical incision without skin excision (Group 2, G2), and 24 (30.8%) had horizontal incision (Group 3, G3). The mean age for the whole cohort was 56.58 ± 9.51 (range: 30-77) with a median of 58.5 years. Details in regard to the groups are shown in table 1. Male and female gender, both represented 50% of the whole cohort (39 patients each), and details in respect to the groups are shown in (Table.1).

Table 1. Clinicopathological features of the included patients

Variables		Vertical with skin excision G1 (n=27)	Vertical without skin excision G2 (n=27)	Horizontal G3 (n=24)	P-value
Age (years) Mean \pm SD		55.52 \pm 10.19	56.19 \pm 10.26	58.21 \pm 7.90	0.59
Age (years) Median (range)		56 (35-77)	57 (30-69)	60.5 (40-72)	0.57
Gender	Female	14 (51.9%)	13 (48.1%)	12 (50%)	1.00
	Male	13 (48.1%)	14 (51.9%)	12 (50%)	
Associated Comorbidities	Yes	3 (11.1%)	4 (14.8%)	3 (12.5%)	0.91
	No	24 (88.9%)	23 (85.2%)	21 (87.5%)	
Lymph nodes yielded Median (range)		10 (8-13)	11 (9-14)	11 (8-13)	0.49
LN ratio	≤ 0.30	20 (74.1%)	20 (74.1%)	17 (70.8%)	1.00
	> 0.30	7 (25.9%)	7 (25.9%)	7 (29.2%)	
Margins	Capsular rupture	0 (0%)	1 (3.7%)	2 (8.3%)	0.29
	Negative	27 (100%)	26 (96.3%)	22 (91.7%)	
Complications	No	23 (85.2%)	20 (74.1%)	15 (62.5%)	0.18
	Yes	4 (14.8%)	7 (25.9%)	9 (37.5%)	
Operative time (minutes) Median (range)		55 (50-70)	60 (50-70)	60 (50-75)	0.09
Hospital stay (days) Median (range)		3 (3-17)	4 (3-14)	5 (4-20)	0.68
Drain removal (postoperative day) Median (range)		11 (9-40)	12 (9-40)	12 (9-50)	0.09

The pathological types of the primary tumors were as follows: Squamous cell carcinoma in 22 patients (G1:7, G2:8, G3:7), Malignant melanoma in 21 cases (G1:6, G2:8, G3:7), Malignant fibrous histiocytoma in 13 patients (G1:5, G2:4, G3:4), Synovial sarcoma in 12 cases (G1:5, G2:4, G3:3), Malignant peripheral nerve sheath tumor in eight cases (G1:3, G2:2, G3:3), Angiosarcoma in one case of the G1. Rhabdomyosarcoma in one patient of the G2.

The operative time was more or less the same in all groups, with a median value of 60 minutes (50-75 minutes). No statistically significant difference was noticed among the three groups regarding the postoperative hospital stay, median duration before drain removal, and number and ratio of lymph nodes yielded, as illustrated in (Table.1).

Associated comorbidities were encountered in 10 patients (12.8%), with no significant differences among the three groups as shown in (Table.1). Five patients had diabetes, two had hypertension, and three patients had

both diabetes and hypertension. Given the details among the groups, we had three patients with comorbidities in G1 (2 had diabetes, and one had diabetes and hypertension), four patients in G2 (2 had hypertension, 1 had diabetes, and 1 had diabetes and hypertension), and three patients in G3 (2 had diabetes, and 1 had diabetes and hypertension).

Complications occurred in a total of 20 cases (25.6%). Its rate was highest in G3 (37.5% of cases) and least in G1 (14.8%), as shown in table 1. The details of the complications are summarized in (Table.2).

Wound infection was the commonest complication, occurred in seven cases (8.9%), and was managed by repeated dressings and systemic antibiotics in all cases. Seroma formation was found in one case (1.3%) in the G1 Group, and we managed this by aspiration with systemic antibiotic coverage. Abscess formation occurred in one case in the G3 Group and was managed by incision and drainage with systemic antibiotics.

Table 2. Postoperative Complications

Complication type	Vertical with skin excision G1 (n=27)	Vertical without skin excision G2 (n=27)	Horizontal G3 (n=24)	Total (n=78)
Wound infection	1 (3.7%)	4 (14.8%)	2 (8.3%)	7 (8.9%)
Flap necrosis	1 (3.7%)	2 (7.4%)	3 (12.5%)	6 (7.7%)
Lymphorrhoea	0	1 (3.7%)	2 (8.3%)	3 (3.8%)
Lymphedema	1 (3.7%)	0	1 (4.2%)	2 (2.6%)
Seroma	1 (3.7%)	0	0	1 (1.3%)
Abscess	0	0	1 (4.2%)	1 (1.3%)
Total	4 (14.8%)	7 (25.9%)	9 (37.5%)	20 (25.6%)

N.B.: p-value could not be calculated because of the small number of complicated cases in each group.

Flap necrosis was a common and the most serious complication. It occurred in six cases (7.7%), and it least occurred in the G1 Group and most in the G3 Group. Five of them required surgical debridement and

systemic antibiotics. One case has been resolved by repeated dressings and systemic antibiotics. (**Fig. 4**) shows some of the documented complications in our study.

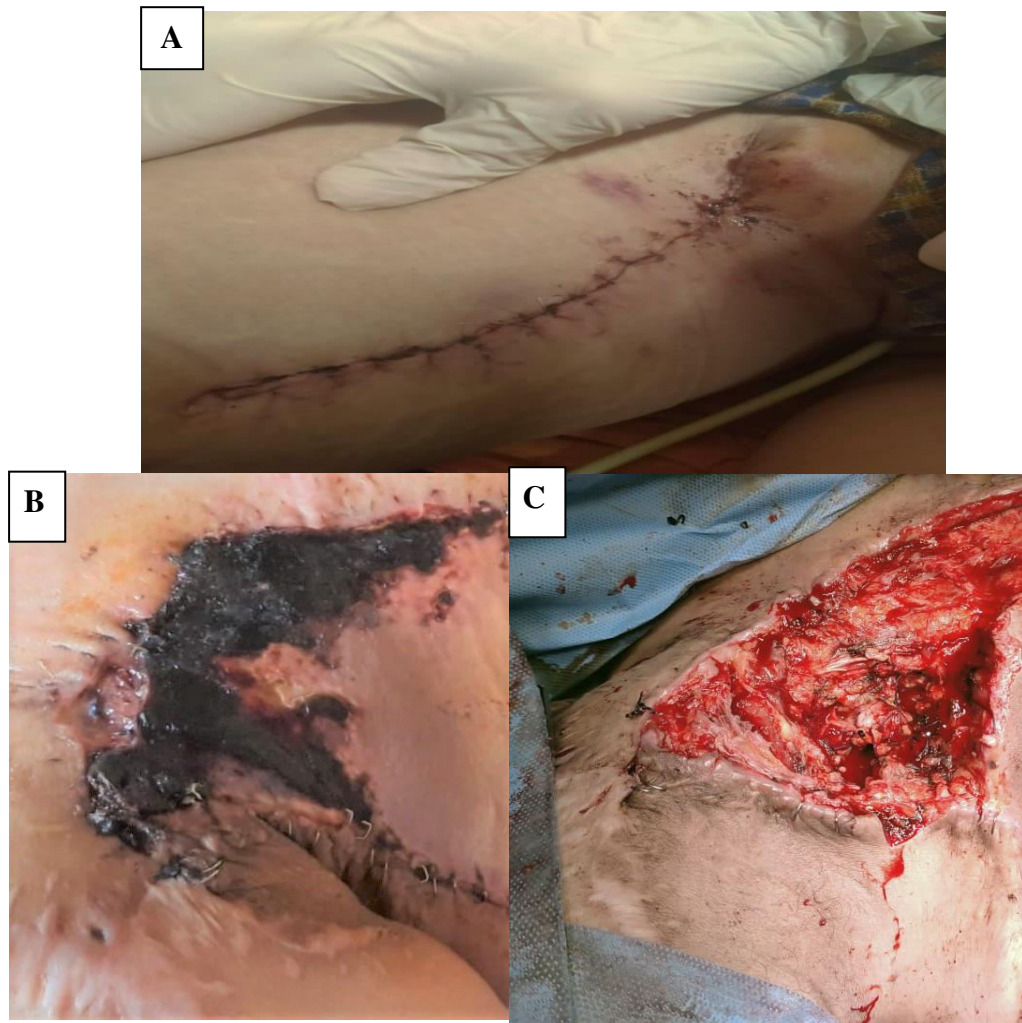


Fig.4. Postoperative complications. A: mildly inflamed wound 10 days after vertical elliptical incision approach, B: Necrotic skin flaps in vertical S-shaped scar 7 days following surgery, C: Debridement of the necrotic skin flaps 10th postoperative day (the vertical S-shaped incision).

We encountered Lymphorrhoea in three patients only (3.8%); non of them in the G1 Group patients. It was managed smoothly with systemic antibiotics and delayed drain removal in all cases (≥ 40 days). Lymphodema

was also managed by systemic antibiotics and delayed removal of the drains (≥ 45 days) as they were associated with wound oozing and underlying minimal collections in most cases, and to guard against 2ry

bacterial infection . It occurred in two cases (2.6%), one in the G1 and the other in the G3 Groups.

Capsular rupture did not occur in G1 patients, and surgical margins were free. Capsular rupture occurred only in one case of G2 (3.7%) and 2 cases of G3 (8.3%). Despite being statistically insignificant (p-value: 0.299), however, it is significant from the oncological and clinical points of view.

Discussion

The wound complications rate from inguinal lymphadenectomy ranges from 6% to 90% in many series (Nabavizadeh et al., 2023; Ray et al., 2018; Vordermark et al., 1985; BYRON RL, 1962; Fortner et al., 1964; Holmes et al., 1977; Bland et al., 1981; Hacker et al., 1981).

Vordermark et al. (1985) had an overall complication rate of 62%. Among the four groups of their study, we are concerned with the first two groups; related to our article: vertical S-shaped without skin excision and vertical with skin excision. Wound major complications occurred in 63% of the first group versus. 14.3% in the skin excision group (Vordermark et al., 1985). The other two groups had some sort of wound reconstruction and are beyond our scope in the study.

A vertical incision is considered to give better exposure for proper inguinal lymphadenectomy (Bertheuil et al., 2015). However, this incision seems to increase the risk of vascular injury and leg edema (Somé et al., 2020; Tonouchi et al., 2004; Rossi et al., 2014). For this, many emphasized the value of an ellipse-shaped incision to reduce skin troubles when a vertical

incision is used (Bertheuil et al., 2015).

The ellipse-shaped incision provides wide exposure and adequate resection with tumor-free margins, particularly bulky and ulcerative lymphadenopathy (Somé et al., 2020; Rossi et al., 2014; Spillane and Thompson, 2018). By including an overlying skin wedge, it aids various benefits. It avoids unnecessary undermining of the skin flaps and reduces wound healing complications and infection rates (Kean et al., 2006).

Bertheuil et al. (2015) conducted a comparison of two types of incisions. Skin necrosis occurred in 0% of the skin excision group patients and 7.6% of the horizontal incision group patients (Bertheuil et al., 2015). In Kean and colleagues' study, which compared two types of incisions, the wound breakdown rate was zero% in vertical incision with skin excision group versus 15.4% of patients in vertical incision without skin excision (Kean et al., 2006). Our study results were comparable, and skin excision was the best incision to reduce flap necrosis rate. Illustrations of some complications we had are presented in figure 4.

Skin excision also avoids unnecessary handling of the specimen as traction is applied to the skin island itself rather than the subcutaneous tissue (Kean et al., 2006). Slight direct specimen handling allows an en-bloc dissection using a “no-touch” technique (Vordermark et al., 1985; Kean et al., 2006). This was very clear in our study as we had no capsular rupture in the G1 patients, while it occurred in the other two groups.

We found a statistically and clinically insignificant difference among the three groups regarding the occurrence of lymphorrhoea and lymphedema. Others also found the same results but with more or less clinical importance. For example, Kean et al. (2006) had 23.1% developed lymphedema in the skin excision group versus 30.7% in the vertical without skin excision group (Kean et al., 2006). Contradictory to this, Bertheuil et al. (2015) had 37% in the skin excision group versus 26% in the horizontal incision group (Bertheuil et al., 2015).

Bertheuil considered that transverse incisions generally reduce the risk of skin suffering and lymphedema but provide less exposure (Bertheuil et al., 2015). Our results were conflicting with this prospect; actually, it offered less exposure and comparable complication rates.

In our study, all patients with associated comorbidities had their disease properly controlled in the perioperative period, which may explain the lack of significant correlation between the occurrence of complications, and the presence of comorbidities. We had only one patient in the G2 group having diabetes and hypertension who suffered a wound infection that resolved with proper antibiotic coverage and repeated dressing along with controlling his blood pressure and blood glucose levels.

Recently, minimally invasive approaches, laparoscopic or robotic-assisted, showed promise in reducing the morbidity of this procedure while achieving adequate oncological outcomes (Nabavizadeh et al., 2023).

Conclusion

Vertical elliptical skin wedge excision in inguinal lymphadenectomy provides better surgical field exposure. It avoids direct handling of the tumor, thus lowering the incidence of capsular rupture of the tumor; therefore is more safe oncologically. It has the least wound complication rate, particularly flap necrosis rate among other incision types. The hope, however, is now in the minimally invasive surgery that loomed on the horizon.

Declarations

Acknowledgment: Not applicable

Author Contributions: All authors contributed nearly equally to the different steps of our study and shared in data collection and analysis, literature research and statistical analysis, manuscript conceptualization, preparation, editing, and reviewing. All authors read and approved the final manuscript.

Ethical Approval and Consent to Participate: Being a retrospective study, no added risks to the patients. IRB at the National Cancer Institute – Cairo University was obtained, the IRB approval number is 2211-510-015.

Consent to Publish: All patients have provided acceptance and consent for publishing their data. All personal information has been made anonymous.

Data Availability: The datasets used/analyzed during this study are available from the corresponding author upon request.

Conflicts of Interest: No conflicts of interest.

Funding Support: No funds were needed.

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