

Exposure of Femoral Vessels Through Transverse Inguinal Crease versus Vertical Incision

Hany Abd El-Momen Abd El-Fattah*

* Vascular Surgery Department - Al-Azhar University, Cairo, Egypt

Corresponding author: Hany Abd El-momen Abd El-fattah,

E-Mail: Hadydayman@gmail.com, Phone: (+02)-01002767339

ABSTRACT

Background: Traditional vertical wound in the femoral triangle carries high risk of more lymphatic affection and complication. So, alternative transverse inguinal crease incision (TICI) is used to avoid such complications.

Aim: to compare the transverse inguinal crease incision with the traditional vertical one (VII) during exposure of femoral vessels for any vascular purpose.

Patients and methods: a comparative study was done. 80 groin incisions (40 for transverse and 40 for vertical incisions for femoral vessel exposure) in SAYED GALAL and ALHUSSIEN University Hospitals from January 2019 to January 2021.

Results: Wound infection rate was 12.6% in VII group compared to 6.3% in TICI group. 13% seroma were observed in VII group; while in TICI group, only 6 (7.5%) seroma were observed. Nine hematomas were observed in VII group (11%) compared to 7.5% in TICI group. Graft occlusion was 7.5% in VII which was higher than TICI that was 5% (4 cases). 7.5% suffered from paresthesia in VII group compared to no case of paresthesia in TICI group. The duration of postoperative stay after VII surgery was relatively longer than that following TICI group which were 14 day compared to 9 days respectively.

Conclusion: The TICI is a good maneuver for exposure of the femoral vessels used for all supra- and infra-inguinal procedures except when the wound extension is expected. TICI has decreased complications rate and shortened hospital stay compared to VII.

Key words: Vascular, Exposure, Femoral, Incision.

INTRODUCTION

Decreasing the rate of wound infection in surgical vascular wound is the corner stone. The use of traditional vertical wound in the femoral triangle carries high risk of more lymphatic affection and complications such as edema, seroma and infection leading to wound dehiscence, graft exposure and rupture of the anastomosis^(1,2).

So, alternative transvers inguinal crease incision is used to avoid such complications⁽³⁾.

The aim of this work is to compare the new transverse inguinal crease incision (TICI) versus the traditional vertical one during exposure of femoral vessels for any purpose. This comparison included many points such as wound infection, seroma formation, hematoma, wound paresthesia, length of hospital stay and graft patency.

PATIENTS AND METHODS

A 2-year comparative study was done on groin incision for vascular reconstructive surgery on 60 patients with 80 groin incisions (40 for transverse and 40 for vertical incisions) in SAYED GALAL and ALHUSSIEN University Hospital from January 2019 to January 2021.

Ethical approval: The study was approved by the Ethics Board of Al-Azhar University and an informed

written consent was taken from each participant in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Surgical procedure:

Patients included in this study underwent any vascular infrainguinal surgery, bypass, repair or even profundoplasty for occlusive diseases or arteriovenous fistula for dialysis. Also, aorto-bifemoral, aorto-monofemoral, iliofemoral or even inguinal incision used for endovascular aortic aneurysm repair (EVAR).

Exclusion criteria:

Patients were excluded if they had undergone previous groin incision, if the profound vessels are too high or too low and its exposure is necessary in the operation, immunocompromised patient and in patients or if the wound extension may be needed. 80 incisions in 60 patients in whom femoral vessels were required for different vascular procedures (Table 1).

Two MD licensed surgeons performed the transverse inguinal crease incision (TICI) and vertical inguinal incisions (VII), respectively (Figure 1).



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Figure (1): transverse and vertical groin incisions

All perpetrations, preoperative, intraoperative and postoperative were the same. In the form of haircut, skin preparation and sterilization by Povidone Iodine, intraoperative and postoperative antibiotics.

The TICI used as 4 to 5 cm incision centralized at the midinguinal point run with oblique direction of the inguinal crease. For the other VII, also 4-5 cm vertical starting from the mid inguinal point. Any lymphatics and lymph nodes in the field was dissected from the lateral to the medial side. Then, the wound was drained by Redyvac after which the subcutaneous was closed by contentious monofilament (Monocryl 3/0) then the skin was closed by continuous subcuticular poly proline 3/0 suture.

RESULTS

Femoral exposure was done in 40 patients. The indications were illustrated in diagram (**Diagram (1)**):

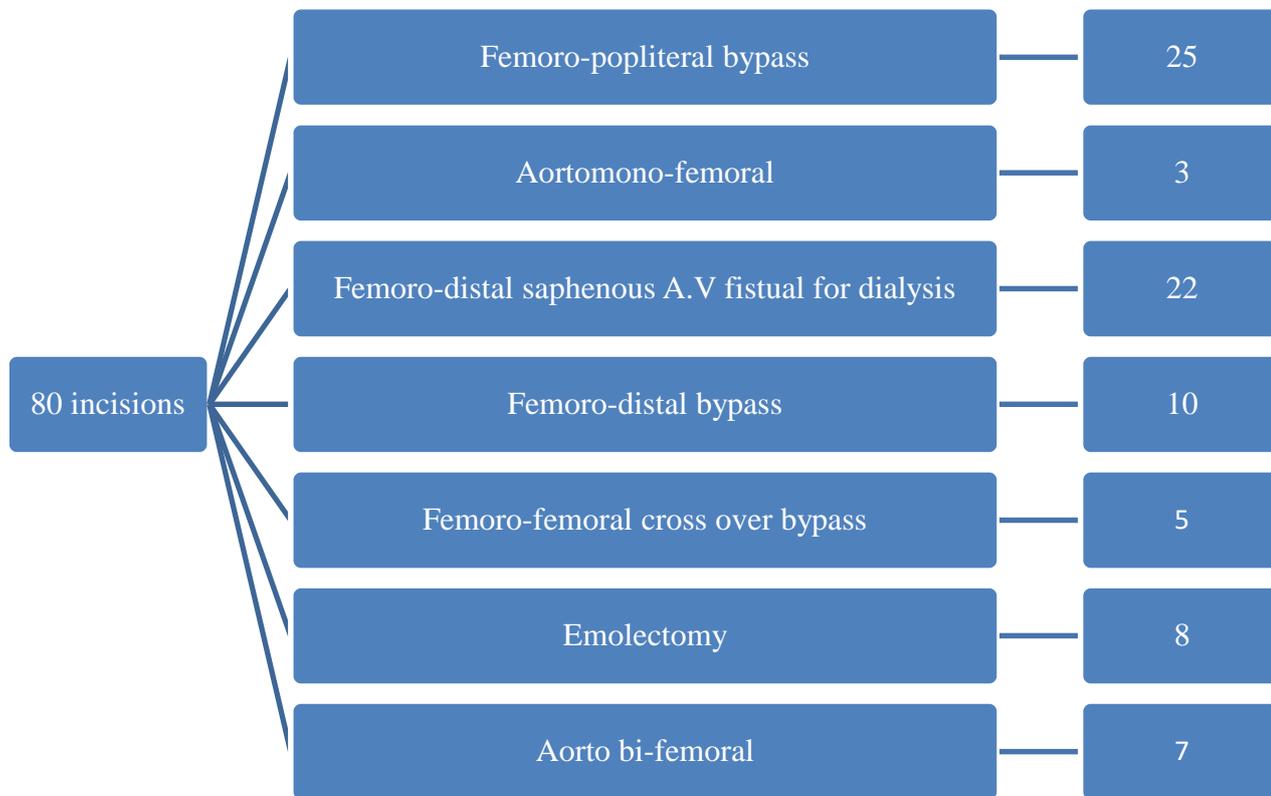


Diagram (1): Indications of femoral exposure and number of patients included

In the following table (Table 1), demographic data were shown.

Table (1): Demographics data of included patients

| Demographics | Overall | TICI | VII |
|------------------------|---------|------------|------------|
| • Number of incisions | 80 | 40 | 40 |
| • Number of patients | 60 | | |
| • Age (years) | ± 50 | 80-20 | 80-20 |
| • Hypertension | 30 | 17 (21%) | 13 (16%) |
| • Smoking | 50 | 20 (25%) | 30 (37.5%) |
| • Obesity | 42 | 18 (22.5%) | 24 (30%) |
| • Respiratory disease | 25 | 14 (17.5%) | 16 (20%) |
| • Cardiac disease | 39 | 19 (24%) | 20 (25%) |
| • Diabetes | 45 | 24 (30%) | 21 (26%) |
| • Hypercholesterolemia | 32 | 16 (20%) | 16 (20%) |

Wound infections were identified by our senior staff of vascular surgeons and graded according to Szilagyi classifications which had three grades: Grade I: in which infection is limited to skin only. Grade II: in which infection reached to the subcutaneous but did not invade the arterial implant. Grade III: the arterial implant was involved (Table 2).

Table (2): Szilagyi grading of wound infections

| Szilagyi grade | TICI | VII |
|----------------|----------|------------|
| Number % | 5 (6.3%) | 10 (12.6%) |
| Grade I | 1 (1.3%) | 3 (3.8%) |
| Grade II | 2 (2.5%) | 4 (5%) |
| Grade III | 2 (2.5%) | 3 (3.8%) |

For any revascularization procedure, limb salvage is always the main cornerstone. Two (2.5%) amputations were performed following bypass using TICI surgery whereas five (6.39%) amputations were performed following the ordinary VII surgery. Ten (13%) seroma were observed in VII group, while in TICI group, only 6 (7.5%) seroma were observed. Nine hematomas were observed in VII group (11%) compared to 6 (7.5%) in TICI group. Graft occlusion: 6 cases of graft occlusion (7.5%) in VII which is higher than TICI that reached 5% (4 cases). Wound paresthesia was found in 6 cases (7.5%) in VII group compared to no case of paresthesia in TICI group. The duration of postoperative stay after VII surgery was relatively longer than that following TICI group, which were 14 days compared to 9 days respectively (Table 3).

Table (3): postoperative Complications

| Complications | TICI | VII |
|-------------------------------|----------|------------|
| Seroma | 6 (7.5%) | 10 (13%) |
| Wound infection | 5 (6.3%) | 10 (12.6%) |
| Major amputation | 2 (2.5%) | 5 (6.3%) |
| Graft occlusion | 4 (5%) | 6 (7.5%) |
| Hematoma | 6 (7.5%) | 9 (11%) |
| Wound paresthesia | - | 6 (7.5%) |
| Hospital stay postoperatively | 14 days | 9 days |

DISCUSSION

In this study, the technique and outcome of TICI was better than the traditional vertical one. The transverse incision and subsequent dissection of the subcutaneous and femoral vessels allowed clear identification of lymphatic vessels and decreased the rate of seroma formation (7.5% in TICI versus 13% in VII; P value = 0.005) and wound infection (6.3% in TICI versus 12.6% VII; P value = 0.007) rate ^(4,5).

Roberts et al. ⁽⁵⁾ and others ^(6,7) registered that complications in lymphatic system was more in vertical incisions than in the transverse one after femoral revascularization. The transverse incision was preferred by **Chuter and colleagues** ⁽¹⁾ as a method of avoiding the high incidence of seroma, wound necrosis and wound infections. This had been reported during exposure of the femoral vessels procedures ⁽¹⁾. **Caiati and colleagues** ⁽²⁾ reported good results with the same transverse inguinal

incision during endovascular aortic stenting. Of 175 groin transverse incisions, an incidence of 2.8% wound infections only. This was due to changing the line of subcutaneous lymphatic dissection from vertical to transverse one with careful ligation of small lymphatic branches. **Schwartz et al.** ⁽⁸⁾ reported that of 99 infra-inguinal procedures, 30% developed wound complications all of them were vertical incisions ⁽⁸⁾.

Another study reported that during EVARs, 40 cases underwent VII to expose the femoral artery. In this study, 8 complications (18%) were involving the vertical incision! The types of these complications varied from superficial infections to reported one case of lymphatic fistula to the skin ^(7, 9). **Chuter and colleagues** ⁽¹⁾ and **Caiati and colleagues** ⁽²⁾ reported advantages of TICI specially in obese patients and this was due to avoiding the incision in the excessive pannus, and closure of the wound without tension ⁽¹⁾. **Van Himbeek and Colleagues** ⁽⁴⁾ reported 13% wound complications in the form of seroma, hematoma and wound infection equivalent to Szilagyi grade II which is similar to our study. This rate of complications is more in VII with subsequent graft thrombosis leading to increasing occlusion rate of the graft (7.3% VII compared with 5.6% TICI as a routine incision instead of the traditional VII one.

The zero rate of paresthesia in our study during TICI was related to careful dissection of the tissues with intervening lymph nodes from the lateral to medial aspect without affection of the femoral nerve. The transverse incision also provides a good operative field specially profundoplasty through easy access to the third part of profunda artery. In a retrospective review by **Parikh et al.** ⁽¹⁰⁾, a significant lower complications rate in transverse incision was found (7% versus 42%) and lower rate of return to operating room too. In a metanalysis published in 2021 and included 5922 femoral incisions. The results are in the same line of the previously reported results. Higher infection rate was associated with longitudinal incision including wound infection and wound dehiscence. Importantly, lymphatic and wound haematomas were not different in both study arms ⁽¹¹⁾. Owing to the difference of blood supply to the skin of the lateral and medial aspects of the skin of the upper thigh, experience of **Raza and colleagues** ⁽⁷⁾ confirmed that the transverse incision was less disruptive to the blood supply necessary to wound healing than the vertical incision. The use of TICI in the previously dissected groin still requires more studies. However, two evidence give good exposure of the femoral vessels in re-do groin

operations, regardless the type of original incision was ⁽¹²⁾.

CONCLUSION

The TICI is a good maneuver for exposure of the femoral vessels used for all supra- and infra-inguinal procedures except when the wound extension is expected. TICI has decreased complications rate and shortened hospital stay compared to VII.

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