

Introduction

Ensuring proper femoral artery access is important, as vascular access-site complications remain a significant cause of morbidity and mortality in cardiac catheterization and percutaneous interventions using the femoral approach. These complications are classified as major or minor. The preferred diagnostic test is duplex ultrasonography, which includes B-mode imaging, color flow imaging, and Doppler pulse wave analysis. Duplex imaging and pulse wave analysis help distinguish between different pathologies. Interventional procedures are performed under ultrasound guidance in clinically stable patients presenting with PSA, AVF, or drainable non-communicating hematomas.

Aim of the Work

The aim of this study was to assess the role of ultrasonography in management of vascular complications sequel to femoral artery catheterization in Alexandria main university hospital.

Patients and Methods

Patients: The study was carried on (30) patients who had femoral artery catheterization procedures and presented by vascular complications to the radio diagnosis department in Alexandria University Hospital from October 2023 till February 2025.

Methods: All patients were subjected to: Detailed personal, medical, and surgical history, taking clinical examination focused on the groin and thigh to identify signs of complications, laboratory investigations including CBC, PT, aPTT, PA and INR. Renal function tests were done when contrast-enhanced imaging was required, ultrasound assessment of the area of concern, non-enhanced MDCT of the abdomen and pelvis was performed in one patient, CT angiography of both lower limbs was conducted in three patients, ultrasound-guided compression was done in 11 patients who had PSA, ultrasound-guided coil embolization of PSA under fluoroscopy was done in one patient presented by recurrent PSA and US guided pigtail catheter insertion using trocar technique was done in two patients presented by sizable liquefied groin hematomas.

Results

The study included 30 patients who presented with vascular complications after iatrogenic femoral artery catheterization. US revealed no vascular complications in six patients, in whom the findings were limited to subcutaneous edema in the groin region and reactive-looking inguinal lymph nodes.

In contrast, 24 patients (80%) demonstrated vascular complications on ultrasound, which were further categorized into significant and non-significant types. Non-significant complications were identified in six patients (25%), while significant vascular complications were present in 18 patients (75%). Out of the 24 patients diagnosed with vascular complications, 14 underwent ultrasound-guided treatment. Among these, 11 patients achieved a successful outcome, while three patients experienced unsuccessful results and subsequently required surgical intervention.

Table 1: Distribution of the studied patients based on the presence and severity of vascular complications detected by US

	No.	%
Vascular complications on US (n = 30)		
Negative	6	20.0
Positive	24	80.0
Non-significant	6	25.0
Significant	18	75.0
Vascular complications (n = 24)		
Non-significant	6	25.0
Deep venous thrombosis	2	8.3
Small organized hematoma	2	8.3
Femoral arterial mural thrombosis	1	4.2
Small femoral hematoma and venous phelibitic changes	1	4.2
Significant	18	75.0
PSA	14	58.3
Large liquified , infective non communicating groin hematoma with aortic dissection	1	4.2
AVF and PSA	1	4.2
Large liquified non communicating groin hematoma	1	4.2
Large organized non communicating groin hematoma with retroperitoneal extension	1	4.2

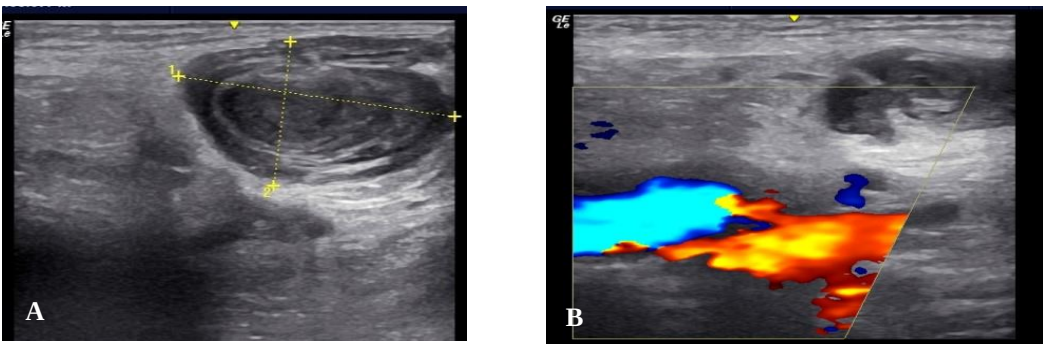


Figure 1:
A: grey scale US of right groin region reveals small organized groin hematoma measuring 2x1.5 cm,
B: Color Doppler images show non communication with nearby femoral vessels.

Table 2: Distribution of the studied patients according to US guided treatment of vascular complications (n = 24)

	No.	%
US guided treatment		
Absent	10	41.7
Present	14	58.3
Successful	11	78.6
Failed	3	21.4
Type of treatment on US (n = 14)		
US-guided compression	11	78.6
US-guided pigtail catheter drainage of groin hematomas	2	14.3
US guided coil embolization under fluoroscopy	1	7.1
Surgical management (n = 6)		
After failed US	3	50.0
Surgery from start	3	50.0

Conclusion

- Early detection and management of vascular complications following femoral artery catheterization are crucial, as unrecognized or untreated complications may lead to limb- or life-threatening sequel.
- Duplex ultrasound serves as the first-line diagnostic modality, capable of identifying or strongly suspecting vascular complications in the majority of cases following femoral artery catheterization.
- Ultrasound-guided therapeutic procedures demonstrate high success rates, particularly in clinically stable patients with PSA or drainable hematomas.
- USGC is most effective in PSAs with a narrow neck diameter ($\leq 3\text{mm}$) and normal coagulation profiles, while wide-neck PSAs show reduced response.