

Inguinal Ligament Safe Space Fallacy

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Background

Retroperitoneal hemorrhage is the dreaded complication of femoral arterial access when performing angiography. Numerous methods have been described for avoidance of this complication, which is generally thought to be very unlikely if the access site is below the inguinal ligament. Among them are fluoroscopic landmarks including the femoral head, angiographic identification of the nadir of the inferior epigastric artery, and even direct sonographic visualization of the inguinal ligament itself. After recently experiencing several unusual cases of retroperitoneal hemorrhage in the absence of a 'high stick', we wanted to further investigate contributory factors.

Methods and Materials

Nuance mPower search for reports from CT studies containing the keywords retroperitoneal hemorrhage / hematoma and femoral pseudoaneurysm / extravasation followed by chart review. Inclusion criteria were presence of retroperitoneal hemorrhage, and pseudoaneurysm or extravasation at a recent arterial access site. Exclusion criterion was etiology of retroperitoneal hemorrhage other than iatrogenic from arterial access.

Case 1

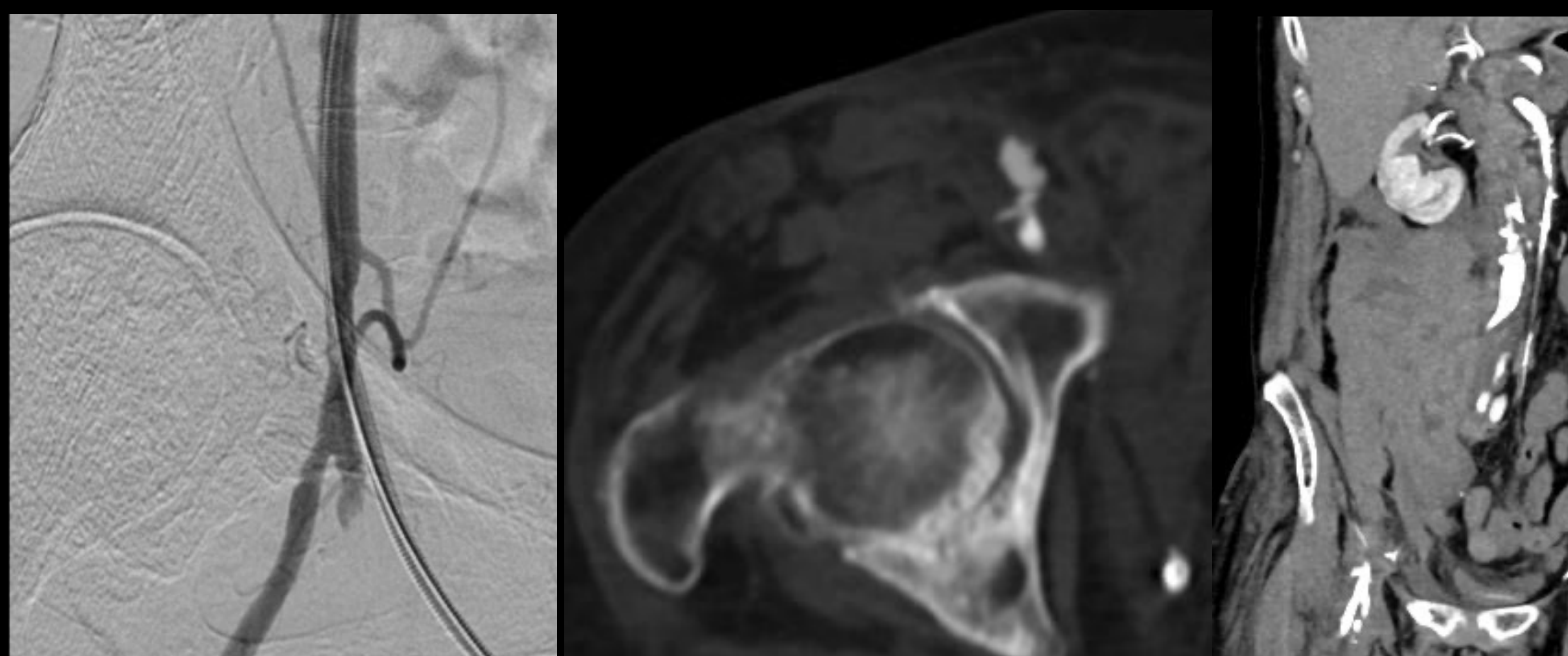


Figure 1A: Ipsilateral femoral angiogram showing the arteriotomy at the level of the mid-head of femur. Figure 1B, 1C: Right CFA pseudoaneurysm and moderate to large retroperitoneal hemorrhage. The right SFA was also occluded (not shown).

Results

Three patients ultimately satisfied the inclusion/exclusion criteria. The patient demographics, procedure details, presentation and treatment of complications are presented in tabular format. Case 1 had intraoperative/postoperative hypertension and an undersized closure device. Case 2 had delayed closure device failure after physical therapy cleared him.

	Age / sex	Procedure	Sheath	Anticoagulation	US access	Stick level	Closure device	Presentation	Treatment	Outcome
Case 1	65 F	LLE atherectomy	7 Fr	5000 U heparin intraoperatively and dual antiplatelet therapy postoperatively.	Yes	Mid-head of femur	6 Fr AngioSeal	ED visit POD 2 with ipsilateral CFA occlusion and critical limb ischemia. Thrombin injection for pseudoaneurysm.	Angiography with atherectomy and stenting for limb ischemia. Thrombin injection for pseudoaneurysm.	ICU admission and eventual discharge.
Case 2	75 M	Ileal GI bleed	5 Fr	None.	No	Mid-head of femur	6 Fr AngioSeal	POD 2 with new onset groin ecchymosis, swelling. Vital instability.	FemoStop, Eventual laparotomy and CFA cutdown.	Death.
Case 3	63 M	RLE atherectomy	7 Fr	9000 U heparin intraoperatively and dual antiplatelet therapy postoperatively.	No	Mid-head of femur	Vascade	Intraoperative ipsilateral groin lump and severe left flank pain. Postoperative vital instability.	Conservative (manual pressure and hold DAPT).	ICU admission and eventual discharge.

Case 2



Figure 2A: Ipsilateral femoral angiogram showing the arteriotomy at the level of the mid-head of femur. Figure 2B, 2C, 2D: Arterial phase CT showing access site hemorrhage with non-enhancing retroperitoneal hematoma. Figure 2E, 2F, 2G: Delayed phase CT showing enhancement extending into the inguinal canal and brisk enhancement of the retroperitoneal hematoma. This patient had a history of unspecified hernia surgery from an outside hospital.

Case 3

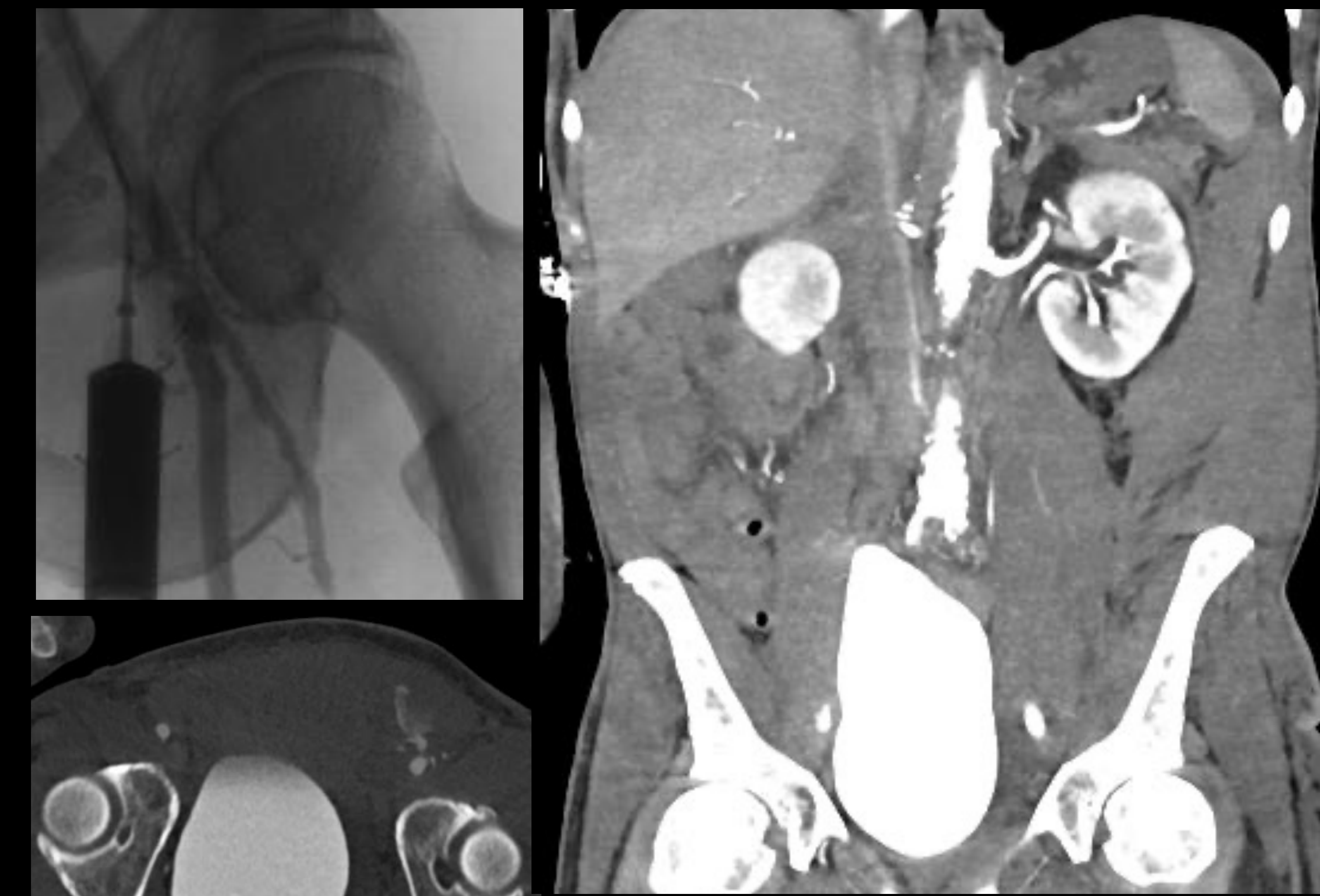


Figure 3A: Ipsilateral femoral angiogram. Figure 3B, 3C: Left CFA extravasation and retroperitoneal hematoma on CT angiogram performed after the patient decompensated post-operatively. This patient had a prior left fem-pop bypass.

Conclusion

The radiographically determined position of the inguinal ligament may be an average of 1.5 cm superior to the actual ligament position and cadaver contrast injection below the inguinal ligament has been shown to result in retroperitoneal contrast accumulation [1]. Regardless, it may be advisable to puncture the femoral artery at the level of the inferior 25% of the head of femur [2]. If the complication is recognized in a timely fashion, contralateral groin access may be utilized to avert disaster [3].

References

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