DEEP CIRCUMFLEX ILIAC ARTERY; THE OVERLOOKED ENTITY IN ABDOMINAL PARACENTESIS

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ABSTRACT:

The deep circumflex iliac artery (DCIA) is an often-overlooked vessel that may be injured during abdominal paracentesis, especially when procedures aim to avoid the more commonly implicated inferior epigastric artery (IEA). We present a case of a 63-year-old male with Staphylococcus aureus bacteremia and an infected right iliopsoas hematoma, likely secondary to anticoagulation. Initial CT imaging revealed an intramuscular collection, which was drained under ultrasound guidance without immediate complications. Two weeks later, follow-up imaging showed a newly developed pseudoaneurysm arising from the right DCIA, with no signs of active bleeding or hemodynamic instability. The pseudoaneurysm was presumed iatrogenic, likely caused during the initial paracentesis when the vessel may have been compressed or not visualized. Conservative management was chosen, and subsequent imaging confirmed spontaneous thrombosis of the lesion. While IEA injury is well-recognized, DCIA involvement is rare and underreported, with fewer than 100 cases described. Given its anatomical course along the iliac crest, the DCIA is at risk during lateral approaches to paracentesis, especially when using a 'blind' technique. This case highlights the importance of thorough knowledge of abdominal wall vascular anatomy to prevent iatrogenic complications during paracentesis, particularly in high-risk patients and those undergoing image-guided or blind procedures.

Keywords: Deep Circumflex Iliac Artery; Paracentesis; Interventional Radiology

CASE REPORT

A 63-year-old male presented with Staphylococcus aureus bacteraemia secondary to an infected right psoas and iliopsoas hematoma, likely related to anticoagulant therapy. Initial computed tomography (CT) of the abdomen revealed an intramuscular collection, predominantly in the iliopsoas muscle (Figure 1A).

Ultrasound-guided drainage was performed uneventfully, yielding hemopurulent fluid; a catheter was left in situ for one week. Two weeks post-procedure, the patient demonstrated clinical improvement. However follow-up CT showed a newly developed round enhancing lesion arising from the right deep circumflex iliac artery (DCIA), with imaging characteristics suggestive of a pseudoaneurysm (Figure 2A). No active contrast extravasation or haemoglobin drop was observed. Retrospectively, the pseudoaneurysm was presumed to be iatrogenic, likely due to prior paracentesis. The drainage guidewire (Figure 2B) passed through the location of DCIA, where the vessel was not visualized possibly compressed by the ultrasound probe during the procedure. Given its late presentation and hemodynamic stability, conservative management was adopted where ultrasound guided compression were performed resulting in partial thrombosis of the aneurysmal sac (Figure 2C).

DISCUSSION

Pseudoaneurysms from the name implies lacking of the complete arterial wall structure and typically result from trauma, infection, or iatrogenic injury.[1] While the inferior epigastric artery (IEA) is the most commonly affected vessel following abdominal paracentesis, DCIA injury, though rarer, has been reported.[2] Although the pseudoaneurysm in this case is believed to be resulted from paracentesis procedure, the adjacent psoas infection is also may contribute to the its development. However, based on the location and retrospective reviewing of the ultrasound image, the former cause is more likely.

Traditionally to avoid IEA injury, paracentesis is often performed laterally in the lower abdomen [3] particularly in ‘blind’ method. However, this approach may increase the risk of DCIA injury, as the vessel courses along the inner aspect of the iliac crest after branching from the external iliac artery.[4-5] Several studies have documented DCIA pseudoaneurysms post-paracentesis, although fewer than 100 cases have been reported. Awareness of abdominal wall vascular anatomy is essential to minimize such complications, particularly when IEA-avoidance strategies may inadvertently expose to the DCIA injury particularly in ‘blind’ technique abdominal paracentesis.

RESULTS

A total of 169 patients were included in the study. The median age was 68 years (interquartile range [IQR]: 9 years). The majority of patients were Malay (79.9%), followed by Chinese (20.1%).

Based on mpMRI findings, 32.0% were classified as PI-RADS 1–2, while 68.0%were classified as PI-RADS 3–5. The median PSA level was 6.7 ng/mL (IQR: 3.7), and the median PI-RADS score was 3.

Of the total cohort, 68 patients underwent transrectal ultrasound (TRUS)-guided biopsy with available histopathological examination (HPE) results. Among these, 61 patients were from the PI-RADS 3–5 group, and 7 were from the PI-RADS 1–2 group. Histopathological analysis showed that 67.65% had benign pathology, including nodular hyperplasia (47%) and benign prostatic hyperplasia (BPH) (20%). Malignancy was detected in 22 patients, comprising adenocarcinoma (27.9%), prostatic intraepithelial neoplasia (2.9%), and B-cell lymphoma (1.4%), as seen in Table 1.

In the analysis of the PI-RADS score and its association with cancer, a total of 68 patients with available histopathological examination (HPE) reports were evaluated. Of these, 7 patients were in the PI-RADS 1–2 group, 25 in the PI-RADS 3 group, and 36 in the PI-RADS 4–5 group. The highest number of cancer diagnoses occurred in the PI-RADS 4–5 group, with 19 cases, followed by 2 cases in the PI-RADS 3 group and 1 case in the PI-RADS 1–2 group, shown in Table 2.

A comparative analysis of demographic and imaging parameters revealed statistically significant differences in both age and PI-RADS scores between patients diagnosed with prostate cancer and those without cancer. Specifically, the median age of patients in the prostate cancer group was 71 years (interquartile range [IQR]: 6), which

was significantly higher than that of patients in the no-cancer group, who had a median age of 66 years (IQR: 9) ($p = 0.045$).

Furthermore, there was a highly significant difference in PI-RADS scores between the two groups ($p < 0.001$). Patients in the cancer group predominantly exhibited PI-RADS scores of 4 to 5 (IQR: 1). In contrast, the no-cancer group had a lower median PI-RADS score of 3 (IQR: 1). The data also demonstrated that high percentage of cases in PI-RADS groups 1–2 (85.7%) and group 3 (93%) showed no presence of cancer.

No other variables assessed in this analysis demonstrated statistically significant differences in median values between the cancer and no-cancer groups, indicating that the observed disparities were primarily driven by differences in age and imaging-based risk stratification, observed in Table 3.

DISCUSSION

This retrospective study assessed the diagnostic value of mpMRI and the PI-RADS scoring system in men with PSA levels in the "diagnostic grey zone" (typically 4–10 ng/mL). Our findings support the growing body of evidence that mpMRI, in conjunction with PI-RADS scoring, is a valuable tool for risk stratification and guiding biopsy decisions in men with equivocal PSA levels. Importantly, cancer detection rates correlated strongly with PI-RADS scores: only one malignancy was identified in the PI-RADS 1–2 group (14.3%), two in the PI-RADS 3 group (8%), and 19 cases (52.8%) in the PI-RADS 4–5 group. These findings mirror those from previous international studies, which estimate malignancy risks of ~4% for PI-RADS 1–2, ~17% for PI-RADS 3, ~46% for PI-RADS 4, and up to 75% for PI-RADS 5 (11,12,13).

The findings of this study are consistent with previously published data on the use of mpMRI in prostate cancer detection. In the PROMIS trial, mpMRI achieved a sensitivity of 93% for prostate cancer, compared to 48% for TRUS biopsy alone (14). Similarly, the PRECISION trial showed that mpMRI-targeted biopsy identified more prostate cancer (38% vs. 26%) and fewer clinically insignificant cancers than standard biopsy (15).

In our study, the proportion of malignancies in patients with high PI-RADS scores (4–5) aligns with the risk stratifications in these trials, further supporting the role of mpMRI in clinical decision-making. Furthermore, the high negative predictive value of low PI-RADS scores (particularly 1–2) in our cohort echoes the growing consensus that mpMRI can effectively exclude prostate cancer in low-suspicion cases, potentially reducing unnecessary biopsies.

The cancer detection rate of 8% in PI-RADS 3 lesions in our study is lower than reported averages in the literature (typically around 17–20%), possibly reflecting differences in patient selection or imaging interpretation. This supports the notion that PI-RADS 3 remains a "grey area" within the broader grey-zone PSA population (16). Additional biomarkers, such as PSA density, Prostate Health Index (PHI), or genomic profiling, may be helpful adjuncts in this subgroup (17).

This study supports the growing role of mpMRI as a gatekeeper before biopsy in patients with PSA levels in the grey zone (18). By stratifying patients based on PI-RADS scores, clinicians can make more informed decisions about whether a biopsy is necessary:

PI-RADS 1–2: The very low malignancy rate (14.3%) in this group suggests that patients can often be managed conservatively with active surveillance and repeat imaging, thus avoiding unnecessary biopsies.

PI-RADS 3: Given the intermediate risk and relatively low cancer detection in our cohort, additional parameters such as PSA density (>0.15 ng/mL/cc), family history, or mpMRI-targeted biomarkers should be considered before deciding on biopsy.

PI-RADS 4–5: These patients had the highest cancer detection rate (52.8%) and should be prioritized for prompt biopsy and further urological evaluation.

Additionally, the statistically significant association between age and cancer risk emphasizes the importance of incorporating

demographic data into prostate cancer risk models. Older age should heighten clinical suspicion, even when PSA levels are only moderately elevated (19). The results also underscore the value of using mpMRI to minimize the psychological and physical burden associated with unnecessary biopsies, particularly in resource-limited settings where invasive procedures should be carefully justified (20).

CONCLUSION

This case highlights the importance of recognizing the deep circumflex iliac artery (DCIA) as a potential source of vascular injury during abdominal paracentesis, particularly when lateral approaches are used to avoid the inferior epigastric artery. Thorough understanding of abdominal wall vascular anatomy and the use of real-time imaging can help minimize the risk of such rare but significant complications.

CONFLICTS OF INTEREST

The authors have no potential conflicts of interest to disclose and are in agreement with the contents of the manuscript.

DATA AVAILABILITY STATEMENT

The data presented in this report is available from the corresponding author upon reasonable request.

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FIGURE LEGEND:

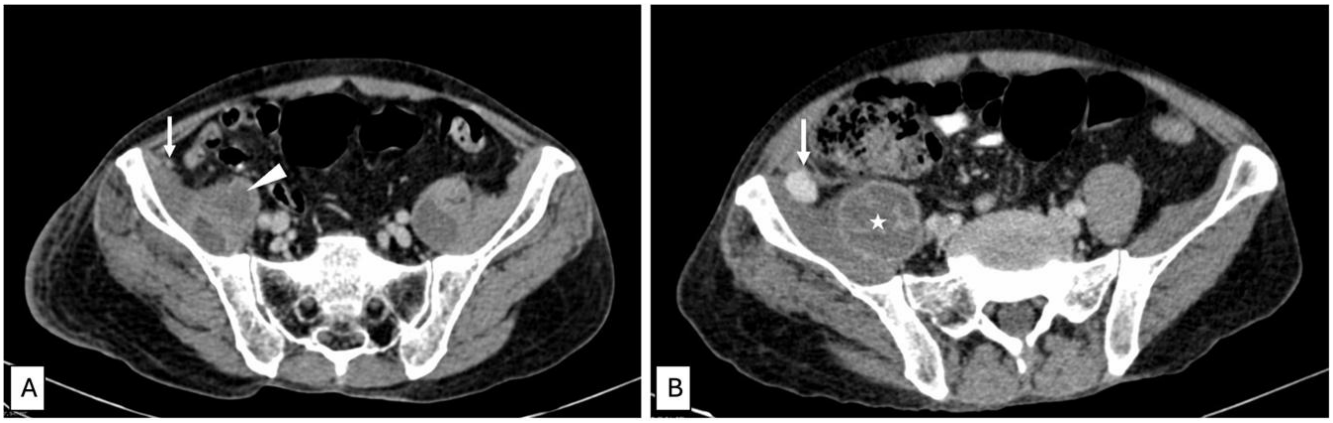

Figure 1 : CECT of the abdomen in axial view showed; (A) an intramuscular collection within the right ilipsoas muscle (white arrowhead) and location of right deep circumflex iliac artery (straight white arrow), (B) follow-up CECT of the abdomen post paracentesis showed organizing right iliopsoas collection (star) and new findings of avidly enhancing lesion originating from right DCIA likely pseudoaneurysm.

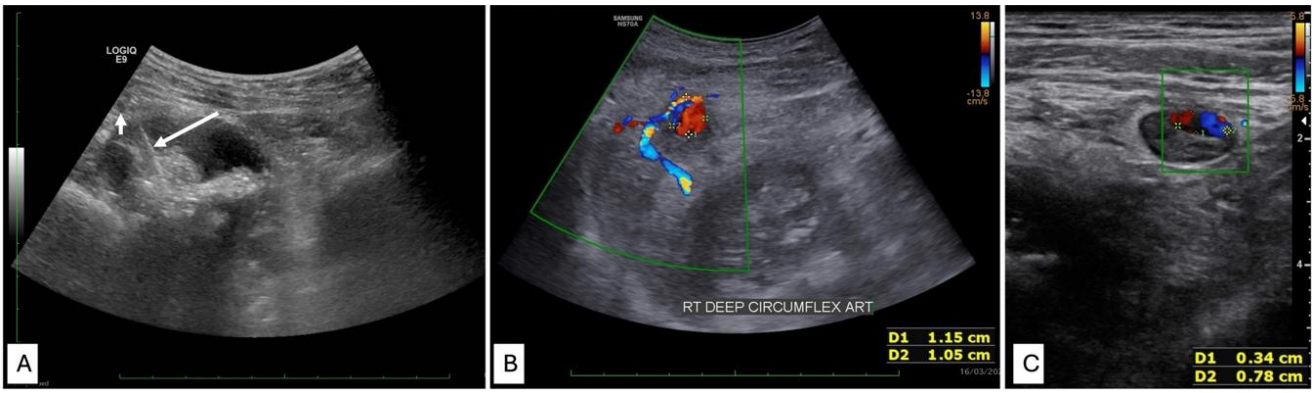

Figure 2: Ultrasound image of right abdominal wall; (A) showing intraprocedural image of drainage guidewire (long arrow) passing through the course of DCIA (short arrow), 2 weeks post procedure (B) showed a new highly-vascular lesion with 'yin-yang sign' arising from DCIA, and (C) post ultrasound-guided compression showed partial thrombosis of the aneurysm sac.